Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

AUGUST 1955

One of Five Specialized Railway Age Publications

formerly Railway Mechanical and Electrical Engineer

Aluminum Pistons—A New Approach

GM High-Speed Train

AAR, Mechanical Division Reports

AAR, Electrical Section Reports

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with the WINE

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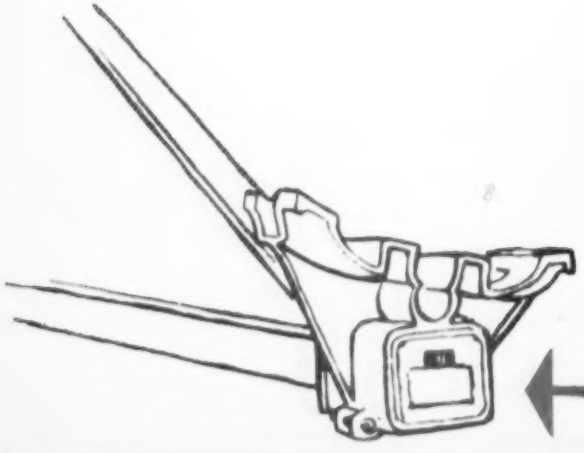
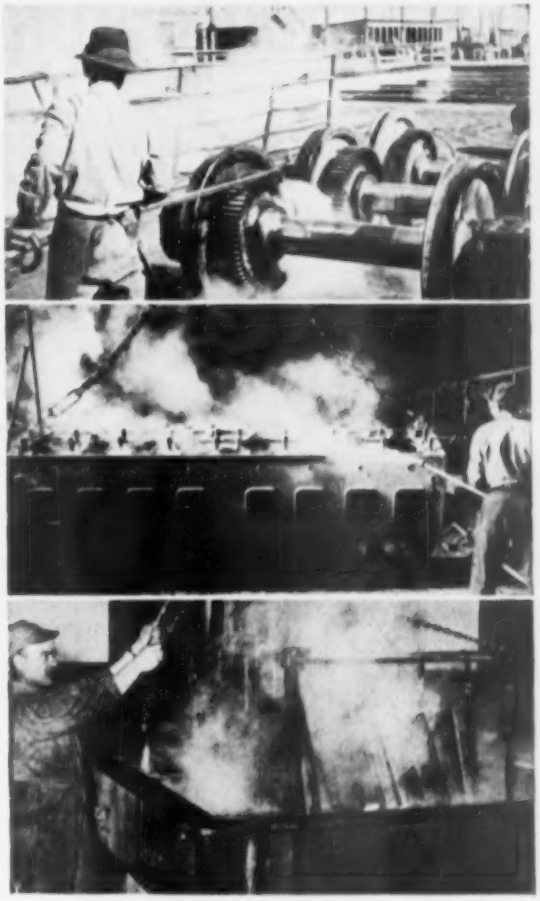


TRUSLOCK

The Buffalo Brake Beam with the Quick-Change Brake Head

20 Jobs in DIESEL SHOPS and Terminals where OAKITE CLEANING is saving money for many roads



At the right are listed 20 of the many different types of work performed in Diesel-electric shops and terminals. It is on just such jobs as these that Oakite cleaning, washing, and descaling materials — and methods — have been so instrumental in saving time and money.

On these and many other similar jobs, Oakite Technical Service Representatives have accumulated vast stores of solid knowledge and practical experience. It is this knowledge, experience, and understanding of modern cleaning techniques that enables them to submit recommendations which result in greater cleaning efficiency and economy in practically every maintenance and overhaul operation.

And it is this same exacting attention to details, this same personal interest in every job, that has prompted so many roads to rely on their Oakite Technical Service Representatives wherever cleaning is concerned. Why not put Oakite experience and service to work for you? Call or write today for details. Oakite Products, Inc., 46 Rector Street, New York 6, New York.

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Lube Oil Coolers	Diesel Locomotives
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Diesel Cooling Systems	Traction Motors
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Engine Parts	Water & Fuel Pumps

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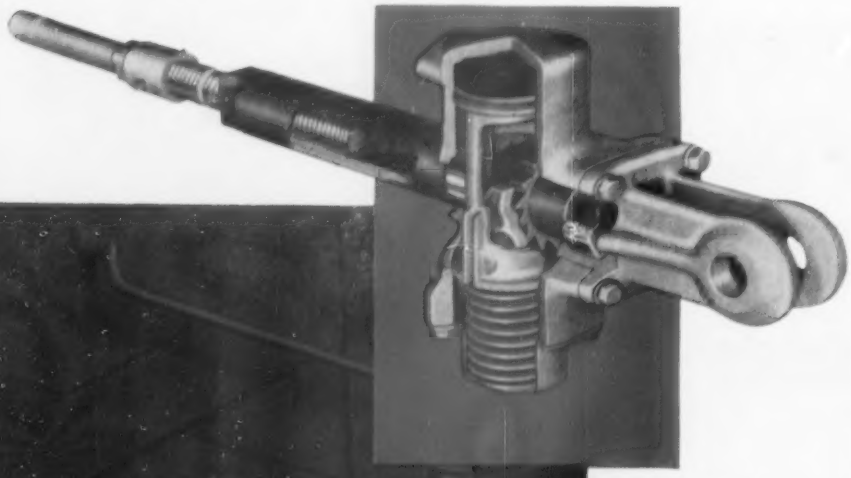
pays dividends through Savings



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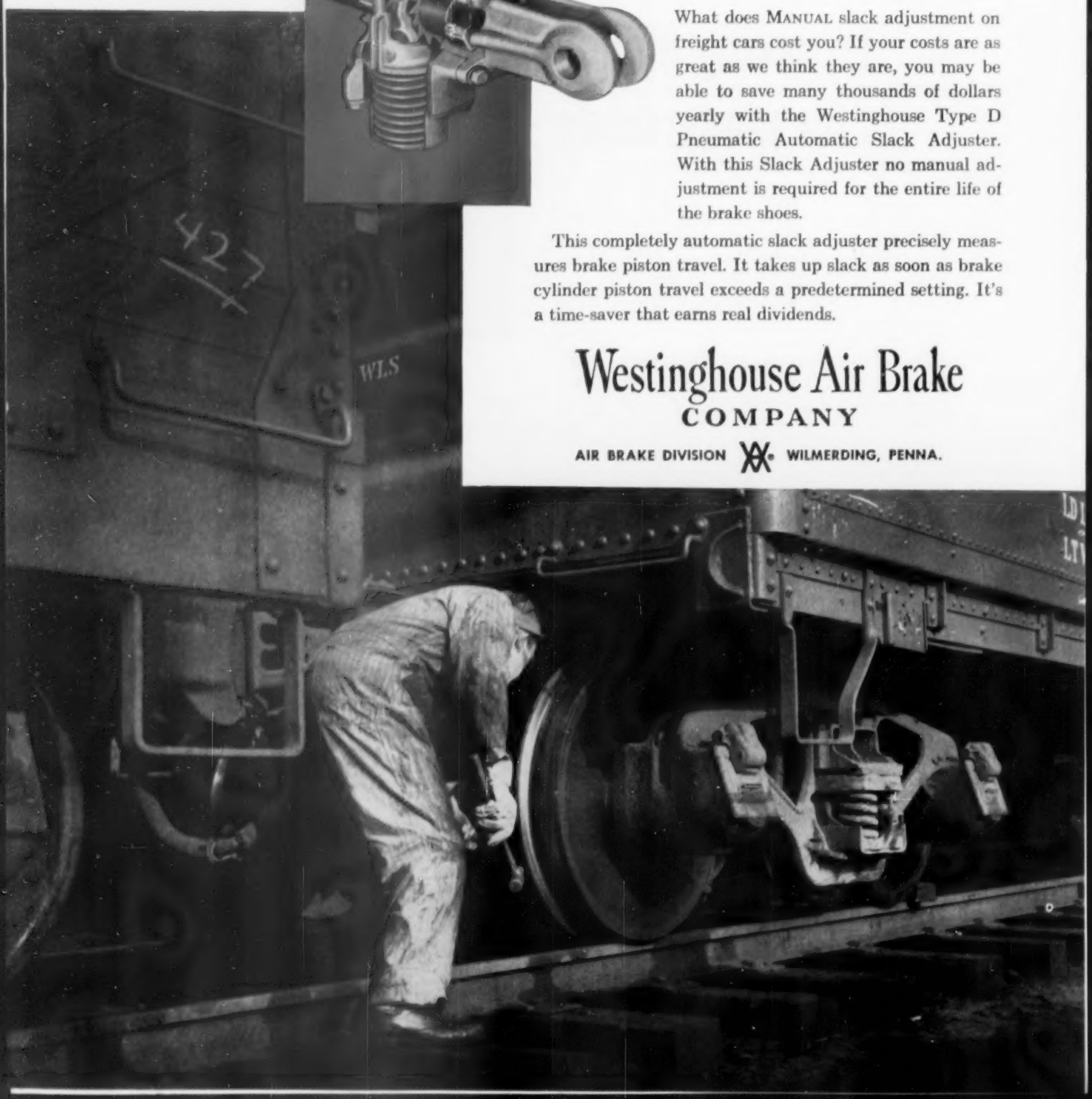

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

AUGUST, 1955 **VOLUME 129, NO. 8**

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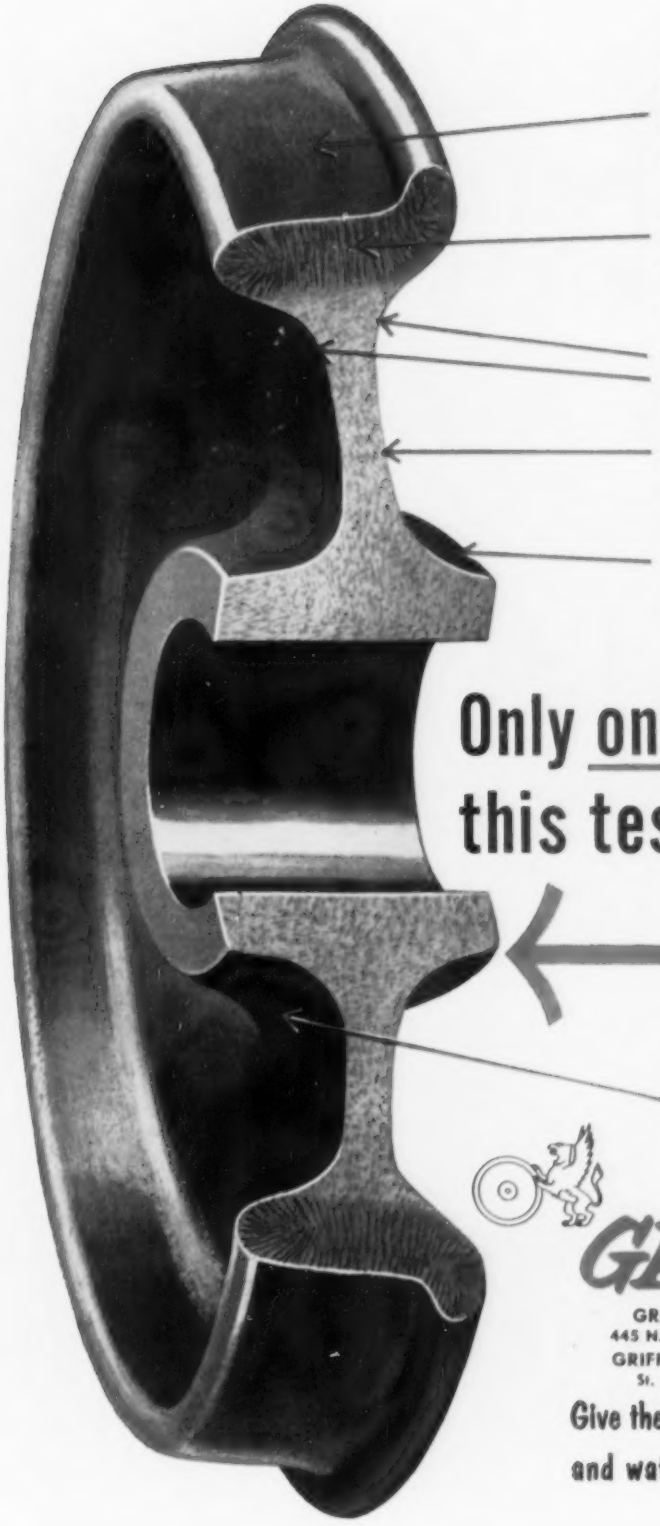

Roundness of EQS wheel is practically perfect—as-cast. No machining necessary . . . the toughest and longest-wearing metal is *on the tread, NOT in the scrap bin.*

Pressure pouring in graphite molds results in superior flange and tread wear. Note the directional solidification in flange and tread, shown before heat treatment: *the grain of the metal in EQS wheels is at right angles to the point of wear.*

Long sweeping fillets under flange and rim of EQS wheels insure greatest possible strength.

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100

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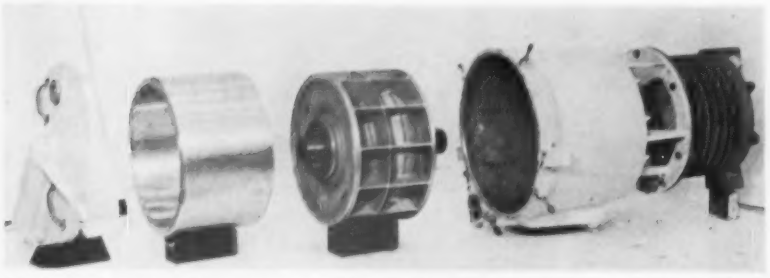


Seprifuge components (from left to right) are the cover, rotor shell, impeller, housing and electric motor. EMD has a hand-truck mounted impeller cleaner especially designed for servicing the Seprifuge. With the system, cost of replaceable filters is eliminated and it is said that the Seprifuge will operate up to two months without attention.

Seprifuge Spin Cleans Lube Oil

Diesel engine lube oil can now be kept clean mechanically with a new development by Electro-Motive. This development, the Seprifuge, has a feature new to diesel locomotive operation in this country—it cleans all the oil delivered to the engine and does this by centrifugal action.

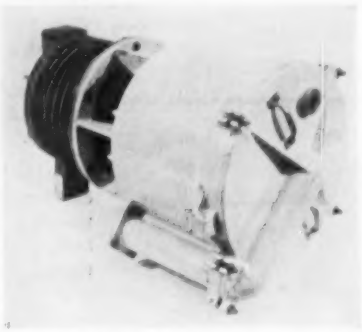
The Seprifuge is located between the scavenging pump and the lube oil delivery to the engine. The oil is cleaned before going through the cooler. The Seprifuge is installed in the space occupied by the lube-oil filter housing on EMD locomotives. Rotative speed varies from 1,140 rpm when the engine is idling to 3,245 rpm at full engine speed. The amounts of oil cleaned at these speeds are 80 and 265 gpm respectively, or all the oil delivered at any engine speed. Pressure drop through it is 8 psi.

The centrifugal cleaner is powered by the locomotive a-c system rated at 149 volts at 106 cycles for full engine speed, and is currently adaptable only to GM power with a-c auxiliaries. However, there is under development a turbine-driven Seprifuge which will utilize part of the fluid energy from the lube oil scavenging pump to drive a turbine which will spin the cleaner. This will enable it to be applied to GM power without a-c current and to competitive engines.

Prior to the development of the Seprifuge, centrifugal oil cleaners were not considered practicable for locomotive application because the largest capacity commercially available was about 30 gpm and was several times as big as the Seprifuge's overall length of 40 in. and diameter of 24 in.

The Seprifuge removes all dirt and other impurities that a filter can remove with the exception of small amounts of amorphous (blow-by) carbon, e.g. the carbon formed by the burning of the fuel. Electro-Motive feels, however, that this carbon does no harm in the lube oil because the detergent keeps it in very finely divided suspension. The principal effect is that the oil will be darker because it will contain an average of 0.1 to 0.2 per cent carbon.

While the Seprifuge develops 2100 G's (2100 times the force of gravity) at the mean radius of the separation port at maximum speed, it does not remove additives from the oil. The cleaning process depends entirely upon the centrifugal force. It separates the impurities from the oil by means of the differences in the specific gravities, and the additives have very nearly the same specific gravity as the lube oil with which they are blended.



Assembled for application to the locomotive, the Seprifuge is 6 in. shorter than the lube oil filter housing it replaces on the locomotive, and fits into the same space on the equipment rack. Powered with an electric motor driven by the a-c system of the General Motors locomotives, speed of the Seprifuge impeller increases as engine speed rises.

Impurities removed from the oil are precipitated out along the inner circumference of the casing. They stick there because the resins that result from the natural breakdown of the oil during operation combine with these impurities to form a sludge of about the consistency of road tar. This mixture, by sticking in the sludge chambers, prevents the dirt and other impurities from returning to the oil stream or contacting it in any way even when the Seprifuge is not running. The sludge chambers hold 1100 cu in.

Uses other than cleaning diesel engine lube oil are foreseen by Electro-Motive. The principal limitation on what the present production Seprifuge can handle is that the fluid to be cleaned must be suitable as a lubricant for its bearings. It could therefore handle such items as diesel fuel or machine tool cutting oil. As a matter of fact, a small model, 30 gpm with a 500 cu in. collection chamber and driven by a 1-hp motor, is under development for this latter purpose. The locomotive model is driven by a 5-hp motor, although its peak requirement is 3.8 hp.

General Motors became interested in the concept of a full flow filter to explore the possibility of preventing the beginning of what may be termed the chain reaction of wear. In this chain reaction a few particles in the oil cause wear in some part of the engine. This wear in turn generates more particles which cause more wear. In line with this thinking, EMD is using the Seprifuge on all new engines to remove foreign material during the break-in running at the plant.

One of the early tests to evaluate the Seprifuge was made on a truck engine and compared the rates of wear on different parts for four possible conditions—no filter, by-pass filter, full flow filter and the Seprifuge. As part of this test a check was made to determine the largest size particle that might ordinarily be found in an engine equipped with the Seprifuge. This was 5 microns (2 to 3 tenths of a thousandth of an inch).

Approximately, 1¼ million miles of test service has been accumulated on the Seprifuge. Currently 14 tests are now running on 12 different railroads, with most of the installations in freight service on dual purpose units.

Typical of the tests using detergent oil was once conducted on an F-7 unit. When the centrifugal cleaner was installed, the air box was cleaned and the cylinder liners were found to have the intake ports about half plugged with carbon on the outboard side and almost completely plugged on the inboard side. Two of the power assemblies were replaced with all new parts to measure the wear.

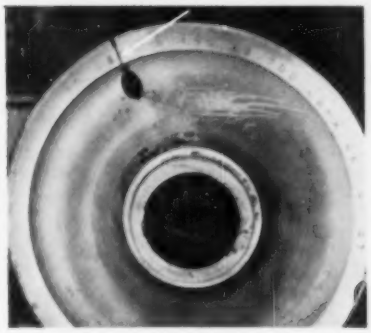
After a little over a half year and 130,000 miles of test service, the two replaced assemblies had carbon deposits between 1/16-in. and 1/8-in. thick. The remaining liners appeared to have about the same amount of deposit as they did at the start of the test. Actually, they probably picked up an 1/8 in. or so, but this slight increase was not visibly apparent with the intake ports already over half plugged.

The Seprifuge was also tested on a locomotive using straight mineral oil. This test showed a high rate of dirt accumulation by the cleaner which EMD feels was due to the faster rate of breakdown of straight mineral oil over additive-type oil. The general result of the test also showed that the Seprifuge can be used with straight mineral oil, but that the use of the mineral oil requires more frequent cleaning of the dirt chambers.

Parallel tests have also been run on three railroads. These tests consisted of running a Seprifuge-equipped locomotive under operating conditions identical to

(Continued on page 110)

NEW INSPECTION METHOD PROVES MORE ACCURATE



Safety and profit are two of the prime requisites of any successful railroad. Every additional mile that a railroad can *safely* obtain from its equipment means increased profit for the road.

The best known method of increasing the life of mechanical equipment of any type is a sound preventive maintenance schedule. One facet of preventive maintenance is the inspection for metal soundness of parts that are subjected to stresses and strains. A hidden crack or other flaw in a critical part could, if not repaired or replaced, cause disaster.

For years, railroad operators the nation over have been searching for a safe and accurate, yet easy-to-use and inexpensive method of locating defects in metal surfaces. In Dy-Chek, a dye penetrant flaw location process manufactured by Turco Products, Inc., the solution has been found.

There are two major advantages of the dye penetrant inspection process over methods formerly used. First the process will locate surface flaws in any metal—ferrous or non-ferrous, magnetic or non-magnetic. Additionally, the process requires neither special lights nor darkened booths. Since flaws are clearly visible under almost any lighting conditions, accuracy of flaw detection is not reduced by improper maintenance or deterioration of electrical equipment. The operator is not subjected to constant changes in light intensity. Thus, eye fatigue and the resultant factor of human error is held to a minimum.

Key to the exceptional accuracy of Turco's Dy-Chek method of dye penetrant inspection is said to be the make-up of the Penetrant and the Remover-Emulsifier (the material used for removing the excess surface penetrant from the part being inspected). Turco's Penetrant is *not* water soluble. It is rendered removable with water *only after application of the Remover-Emulsifier*. Since the Remover-Emulsifier is applied by brushing or dipping, and then immediately rinsed off the part, it does not have a chance to enter the flaw. Thus, a heavy water rinse can be employed without danger of removing Penetrant from even shallow or wide open defects. This factor is particularly advantageous on irregular surfaces or sand castings, as it is necessary that all traces of surface penetrant be removed.

A full color and sound, twenty-three minute 16mm motion picture which visually demonstrates every aspect of flaw location with dye penetrants has recently been completed by Turco and is available for free showing to railroad groups. The film is more fully described in the advertisement to the right.

(Advertisement)

FREE Showing

TRAINING MOVIE

DYE PENETRANT METHODS OF FLAW DETECTION

IN YOUR PLANT OR LOCATION OF YOUR CHOICE

full color... **clear narration**

PLUS ACTUAL DEMONSTRATION OF DYE PENETRANT INSPECTIONS

Now... your inspection department can get the full story of flaw location with dye penetrants... can see *actual on-location* dye penetrant inspections, *right in your own plant!* Produced by Turco, manufacturer of the Dy-Chek® inspection process, this film visually demonstrates *every* aspect of dye penetrant inspections from laboratory theory to authentic production-line techniques actually filmed on the spot during mass production inspections.

If your plant or technical group is interested, write today for full details without cost or obligation.

Attention: **RAILROADS!**

SEE... Location of fractures in diesel wheels

SEE... Mass production inspection of valves and other small parts

SEE... Detection of heat cracks in disc brake plates

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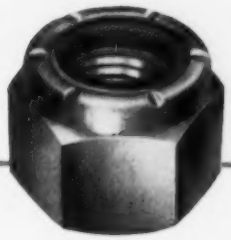

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coupler carriers
draw gears
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brake rigging
spring equalizer seats
truck mounted equipment
center plate bolts
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☐ Rollpin bulletin
☐ Here is our problem. What fastener do you suggest?

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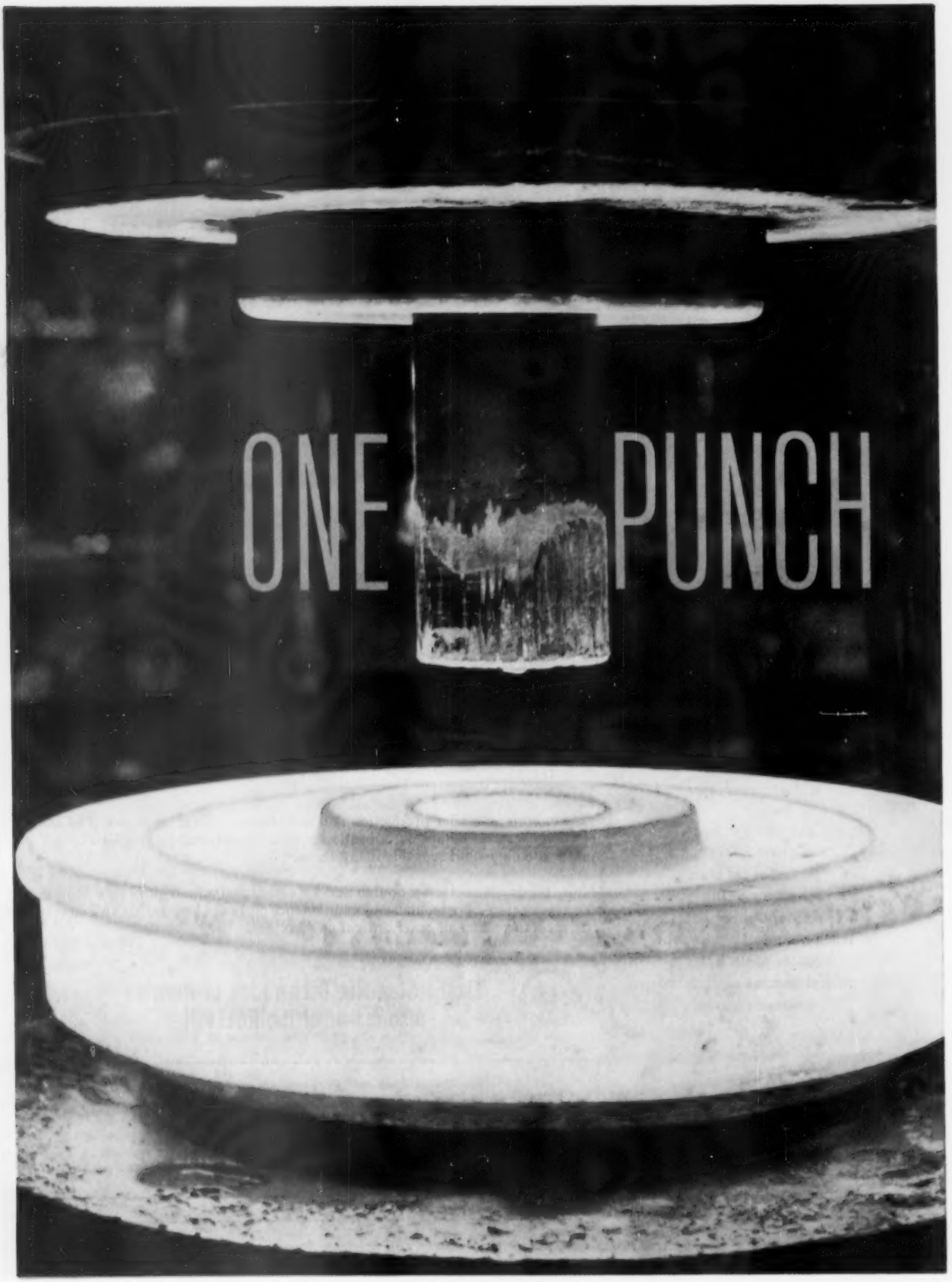
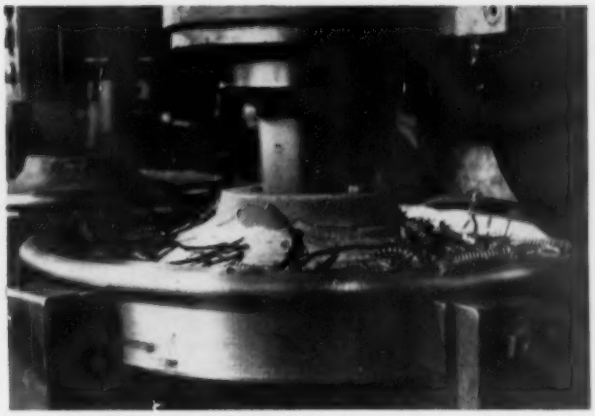

ONE PUNCH



BORING OF A WHEEL HUB. Hub may be rough bored or finished bored to customer specifications on this modern semi-automatic wheel boring mill.

KNOCKOUT!

ONE POWERFUL THRUST of this giant punch and the center of a wheel hub is literally knocked out—a very important step in the forging of USS *Wrought* Steel Wheels.

During the production of a wheel block, the metal is worked in a direction parallel to the axis of the original ingot—a process which ultimately leaves the zone of ingot segregation in the center of the wheel hub. But the relentless punch press takes care of that—and the unwanted zone of segregation goes clattering into the waste pit.

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But what does the Wrought Steel Wheel do for you?

IT LASTS LONGER . . . USS One-Wear *Wrought* Steel Wheels will average 200,000 to 300,000 miles or more in normal freight car service.

IT COSTS LESS . . . Its far greater life in any given service will reflect a *substantially lower annual cost* than that of the ordinary wheel, even though, initially, the One-Wear *Wrought* Steel Wheel costs a little more than the ordinary type wheel.

REQUIRES LESS MAINTENANCE . . . Rolling on One-Wear *Wrought* Steel Wheels, a car spends more time *in service* and less time on repair sidings, resulting in increased revenue to the railroad. Also, less frequent repair means reduced maintenance and lower labor costs.

SAVES UNSPRUNG WEIGHT . . . Because they are lighter than ordinary wheels, eight *Wrought* Steel Wheels under a 50-ton capacity car will save approximately 1,520 lbs. of unsprung weight, which can be directly converted into payload capacity—or result in savings due to the decreased load. Furthermore, reduced unsprung weight means less pounding on the track system.

Two strategically located complete wheel shops are ready to fill your orders for *Wrought* Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania shop, serving the East and Southeast, and the Gary, Indiana shop, supplying the Western and Southern Lines.

USS WROUGHT STEEL WHEELS

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.

USS

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

NEWS. . . . . .

Rising Diesel Maintenance Costs

An increase of 19 per cent per year in repair costs of diesel-electric locomotives is indicated in a statement made by J. M. Symes, president, Pennsylvania, in speaking recently before the I.C.C. on the Ex Parte 175 rate case.

Mr. Symes said in part: "The railroads as a whole, including the Pennsylvania, benefited greater after World War II through the economies in dieselization. However, the economies that have been obtained to date cannot be maintained in the future. As time goes on and mileage is accumulated, repair costs go up. We have been taking a great deal out of these diesel locomotives, but have been putting back very little, thus far. Eventually this will catch up with us. The trend is already there. In 1948, our repair cost per diesel unit mile was 13.46¢. In the next year, it was 18.90¢. In 1952, it was 25.31¢. In 1953, 25.93¢, and in 1954, 28.87¢. The increase was 114 per cent in 6 years. Equating the figures to the 1951 dollar value, we find that with an average age of only 4.3 years, the diesels have reached an average repair cost of 27.76¢ per unit mile—practically the same as for our electric locomotives in 1940 when their average age was 8.3 years. That clearly reflects the fact that the diesel locomotive, with its vastly more complicated internal combustion engines and associated control apparatus, in the long run must cost more to maintain than the more simple and more rugged all electric locomotive. Our experience with the electric locomotive teaches us that this trend of increased maintenance expense which has already manifested itself with respect to the diesel will continue."

Roads Move To Increase Car Supply

A three-way program aimed at increasing the nation's serviceable freight-car fleet by some 80,000 new or newly repaired units, and at upgrading additional cars for high-class loading, was agreed to by member roads of the Association of American Railroads at a special meeting held in Chicago on June 24.

The repair program, adopted as "the quickest means of increasing the serviceable freight-car supply to meet anticipated traffic demands," has as its immediate goal a reduction in the number of cars awaiting repair from 6.4% of total ownership (as of June 1) to or below 5%. This repair goal, which will have the effect of adding about 25,000 cars to the serviceable supply, was formally stated in a resolution unanimously adopted at the Chicago meeting.

By another section of the same resolution, the AAR member roads agreed that they would, "to the extent necessary to meet requirements of their shippers," upgrade cars which are "basically serviceable but not suitable for high-class loading." No specific goal was established, however, for this part of the program.

The new-car aspect of the three-way program was not embodied in a resolution, but was announced following an informal poll of roads represented at the meeting, in the course of which they announced their collective intention of ordering at least 38,000 new cars, to cost an estimated $300 million, within a few weeks or months. These cars, added to approximately 17,000 then on order, at a cost of about $150 million, and to the 25,000 to be restored to serviceable condition, make up the total of 80,000 new or newly repaired cars which represent the railroads' immediate goal.

No announcement was made concerning number or types of cars to be ordered by any individual railroad, but the orders, inquiries and authorizations, reported elsewhere in these pages indicate that some of the larger roads are acting immediately to carry out their intentions.

Purpose of the Chicago meeting was to rectify the situation caused by recent declines in the serviceable car fleet in the face of increased demand for cars. Since February 1, 1954, when freight car owner-

(Continued on page 14)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of April 1955	Month of April 1954	4 months ended with April 1955	4 months ended with April 1954
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	4,966	5,496	19,394	26,577
3-06	Total, Diesel-electric	34,272	31,709	135,535	124,318
3-07	Total, electric	740	655	2,818	2,562
3-04	Total, locomotive-miles	40,186	37,957	158,560	153,778
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,622	1,459	6,254	5,810
4-06	Empty, total	896	850	3,527	3,411
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	11,900	10,965	44,198	50,742
6-02	Total in oil-burning steam locomotive trains	1,547	1,581	5,241	8,692
6-03	Total in Diesel-electric locomotive trains	97,369	87,550	378,559	340,530
6-04	Total in electric locomotive trains	2,272	2,031	8,544	7,825
6-06	Total in all trains	113,810	102,492	439,272	408,923
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.02	1.02	1.02	1.02
10-02	Loaded freight car-miles	43.30	41.00	42.20	40.50
10-03	Empty freight car-miles	23.90	23.90	23.80	23.70
10-04	Total freight car-miles (excluding caboose)	67.20	64.90	66.00	64.20
10-05	Gross ton-miles (excluding locomotive and tender)	3,034	2,880	2,966	2,847
10-06	Net ton-miles	1,365	1,264	1,325	1,251
12	Net ton-miles per loaded car-mile (M-211)	31.60	30.80	31.40	30.90
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	64.40	63.20	63.90	63.00
14	Averages per train hour (M-211):				
14-01	Train miles	19.00	19.00	19.00	18.90
14-02	Gross ton-miles (excluding locomotive and tender)	56,930	54,172	55,689	53,280
14	Average car-miles per freight car day (M-240):				
14-01	Serviceable	46.70	41.70	45.10	41.50
14-02	All	43.90	39.50	42.40	39.40
15	Average net ton-miles per freight car-day (M-240)	892	769	850	769
17	Per cent of home cars of total freight cars on the line (M-240)	47.80	55.50	50.20	54.40

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	1,415	2,233	5,550	10,121
3-06	Diesel-electric	19,580	20,615	80,473	82,059
3-07	Electric	1,303	1,394	5,363	5,658
3-04	Total	22,299	24,243	91,388	97,839
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	227,226	241,702	921,585	976,116
4-09	Total in coal-burning steam locomotive trains	8,032	11,390	32,075	52,341
4-10	Total in oil-burning steam locomotive trains	3,409	7,380	13,386	31,476
4-11	Total in Diesel-electric locomotive trains	200,469	206,999	814,072	828,640
12	Total car-miles per train-miles	9.78	9.59	9.70	9.61

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	263	291	1,000	1,310
1-02	Steam, oil-burning	41	49	164	210
1-03	Diesel-electric[1]	3,425	3,208	13,659	12,935
1-06	Total	3,736	3,558	14,851	14,498
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	8	12	38	53
2-02	Steam, oil-burning	5	4	19	17
2-03	Diesel-electric[1]	234	251	970	1,016
2-06	Total	273	293	1,131	1,195
3	Hours per yard locomotive-day:				
3-01	Steam	5.10	4.40	4.80	4.70
3-02	Diesel-electric	15.20	15.00	15.20	15.10
3-05	Serviceable	15.00	14.30	15.00	14.40
3-06	All locomotives (serviceable, unserviceable and stored)	13.10	12.20	13.00	12.30
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.60	1.69	1.65	1.73
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.75	.75	.76	.76

[1]Excludes B and trailing A units.

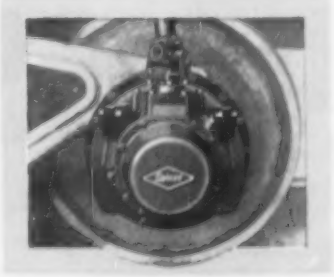
Photo—courtesy of Erie Railroad

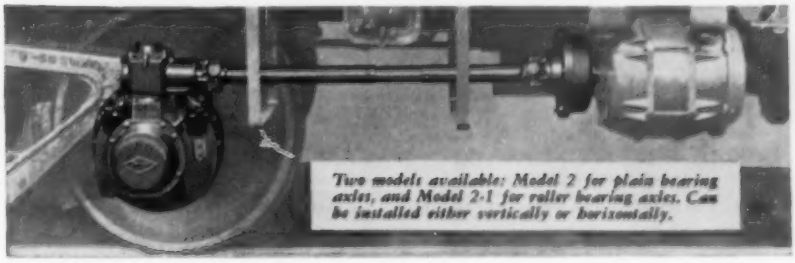
and with a 25-mile radius of track operations through 2-way radio powered by Spicer Generator Drives!

The conductor with 2-way radio has at his command an instantaneous "round-up" of the operating news and conditions on his train . . . *whenever* he needs it . . . *wherever* he needs it.

Mechanical troubles are remedied more quickly. Delays and tie-ups are minimized. Cargo damage or spoilage is reduced. Trains can't get "lost." Changes in train orders can be given en route, with better dispatch and efficiency. A greater measure of safety for train and crew is assured day and night. And operating situations for all trains in a 25-mile radius can be inter-communicated for the benefit of all.

Write for illustrated bulletin No. 323 giving complete details of the new, small ½ to 5 KW Spicer Positive Generator Drive for low-cost adaptation to caboose, baggage, mail and refrigerator cars.





Two models available: Model 2 for plain bearing axles, and Model 2-1 for roller bearing axles. Can be installed either vertically or horizontally.

Spicer

DANA CORPORATION

Toledo 1, Ohio

NEWS

(Continued from page 12)

ship of Class I roads reached a postwar peak of 1,777,080 units, there has been a decline of 57,000 in number of cars owned, and of 75,000 in number of serviceable units, both conditions reflecting the downward trend in railroad traffic and revenues in 1954. Since the first of this year, however, car loadings have increased; through June 25 total revenue loads were 8.9 per cent over those in the corresponding period of 1954. As a result, the substantial net surplus of cars available at the beginning of this year has been converted to a shortage which is currently averaging in excess of 10,000 cars a day.

Mechanical Facilities To Be Provided at New Frisco Yard

Directors of the St. Louis-San Francisco have approved a $16-million yard construction program to provide new or completely rebuilt facilities near Memphis, and at Tulsa, Okla.

Larger of the two projects is a wholly new yard at Capleville, Tenn., near Memphis, to replace present facilities at Yale yard. Work on the new yard has been started and will continue for about 30 months.

At the Tennessee yard a diesel repair and service shop with five engine servicing tracks will be provided. In addition to servicing equipment, the shop will house offices for the general foreman, shop foreman and other personnel, wash and locker rooms for enginemen and shop men, a heating and compressor room, machine, carpenter, electric, pipe, parts reconditioning, air brake repair filter and parts cleaning and radio repair shops.

The repair yard will have a lumber and storeroom track, a wrecker track and three rip tracks—the latter under cover of a full span steel shed 80 by 500 ft mounted 22 ft over the tracks. An adjoining building 20 by 500 ft will house machine, blacksmith, paint and mill shops, supply, tool, air-brake, packing and oil storage rooms, wash locker and heating rooms and an office. There will be a separate storeroom and a lumber storage building.

The Tulsa project will utilize the site and some of the buildings of the present facility there.

Holcombe Parkes Heads Railway Progress Institute

Holcombe Parkes, vice-president and director of public relations of the New York advertising firm of Benton & Bowles, Inc., has been named president of the Railway Progress Institute—formerly the Railway Business Association. Mr. Parkes is located at the RPI's Chicago headquarters. He succeeds P. Harvey Middleton, president of the former RBA, who has retired. Creation of the RPI to succeed the RBA was reported in the July issue, page 14.

Mr. Parkes was an associate editor of the Railway Age from 1919 to 1923.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE JULY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	No. of units	Horsepower	Service	Builder
Illinois Terminal	12[1]	1,200	Switching	Electro-Motive
Lake Superior & Ishpeming	1[2]	1,600		Alco Products
Long Island	10[3]	1,600	General purpose	Alco Products
Midland of Manitoba	1[4]	900	Switching	General Motors Diesel, Ltd.
New York, New Haven & Hartford	2[5]	1,700	Passenger	Fairbanks, Morse
Norfolk & Portsmouth Belt Line	5[6]	1,200	Road switching	Electro-Motive
Norfolk Southern	2[7]	1,600	All service	Baldwin-Lima-Hamilton
Seaboard Air Line	10[8]	1,750	Road switching	Electro-Motive
Southern	5[9]	1,200	Trainmaster	Fairbanks, Morse

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Ann Arbor	7[10]	Cabooses	International Railway Car
Atchison, Topeka & Santa Fe	300[11]	70-ton covered hopper	Pullman-Standard
Chesapeake & Ohio	500[12]	50-ton box	ACF Industries
Chicago & North Western	750[13]	50-ton box	Pullman-Standard
	155[13]	70-ton covered hopper	Pullman-Standard
Chicago, Rock Island & Pacific	38[14]	70-ton covered hopper	Pullman-Standard
Denver & Rio Grande Western	100[15]	Stock	Company shops
Detroit, Toledo & Ironton	50[16]	70-ton covered hopper	Pullman-Standard
Florida East Coast	35[17]	70-ton covered hopper	Pullman-Standard
Great Northern	15[18]	Covered hopper	General American
Gulf, Mobile & Ohio	400[19]	50-ton box	ACF Industries
Kansas City Southern	300[20]	50-ton box	ACF Industries
Maine Central	250[21]	Box	ACF Industries
Minneapolis & St. Louis	40[22]	70-ton covered hopper	Pullman-Standard
Norfolk & Western	50[23]	70-ton covered hopper	Pullman-Standard
North American Car Corp.	30[24]	70-ton covered hopper	Pullman-Standard
St. Louis-Southwestern	75[25]	50-ton flat	Greenville Steel Car
	225[25]	50-ton box	Pullman-Standard
Seaboard Air Line	1,000[26]	50-ton box	Pullman-Standard
	200[26]	70-ton covered phosphate	Bethlehem Steel
	200[26]	70-ton covered cement	ACF Industries
Southern	750[27]	70-ton hopper	Pullman-Standard
	750[27]	70-ton hopper	ACF Industries
Southern Pacific	200[28]	Box	Pullman-Standard
	750[28]	Box	Company shops
Toronto, Hamilton & Buffalo	20[29]	70-ton covered hopper	National Steel Car
Wabash	10[30]	Caboose	International Railway Car
Western Maryland	400[31]	70-ton hopper	Bethlehem Steel
Western Fruit Express Co.	100	70-ton bunkerless refrigerator	Pacific Car & Foundry

FREIGHT-CAR INQUIRIES

New York Central	3,000	50-ton box	

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Chicago & North Western	16[32]	Gallery type coaches	Pullman-Standard
Duluth, South Shore & Atlantic	1[33]	Rail diesel (RDC-1)	Budd Co.
Railway Express Agency	200[34]	50-ton refrigerator	General American

[1] For delivery in October. Estimated cost, $1,400,000.
[2] For delivery this month. Approximate cost, $145,000.
[3] At a cost of $1,600,000. Delivery is scheduled for next September and will permit the road to scrap its 12 remaining steam locomotives. The new units, authorization to purchase which was reported in *Railway Age*, May 30, page 10, will give the LI a fleet of 75 diesels, more than half of which will operate in passenger service, pulling about one-fifth of its 690 daily passenger trains. The other four-fifths are self-propelled by third-rail power.
[4] Approximate cost, $126,000. Delivery scheduled for January.
[5] One for use at each end of the double-ended Talgo train which the road has on order from ACF Industries.
[6] These units are part of 15 to be purchased to eliminate steam power on the N&PBL by the end of 1956. Cost of the 15 diesels and necessary facilities is expected to exceed $1,750,000. The road now owns 23 steam locomotives.
[7] Cost, $307,605. Delivery expected November 1.
[8] Cost, $1,600,000. Electro-Motive also will rebuild and convert 12 other SAL diesel units from 1,350 hp to 1,750 hp at a cost of $1,500,000. The units to be converted (purchased in 1942–43) were among the first freight locomotives to be acquired by the railroad. Deliveries of both new and rebuilt units are expected to begin in September and be completed by December.
[9] Delivered in June. Approximate cost, $1,200,000.
[10] For delivery during third quarter of this year.
[11] Deliveries expected to begin in September.
[12] Cost, $5,750,000. Delivered schedule for October or November.
[13] Deliveries of box cars scheduled for September and October; the covered hopper cars, August and September.
[14] Delivery completed.
[15] Estimated cost of these double-deck cars, $700,000. Deliveries scheduled for the fourth quarter of this year.
[16] Estimated cost, $440,000. Delivery expected August 15.
[17] Cost, $259,000.
[18] Estimated cost of these Airslide cars, $200,000. Delivery scheduled for November.
[19] Deliveries to begin in November.
[20] Estimated cost, $1,900,000. For delivery during first quarter of 1956.
[21] Estimated cost, $1,900,000. For delivery in December and January.
[22] Approximate cost, $300,000. Delivery expected this month.
[23] Approximate cost, $400,000. Cars delivered.
[24] Approximate unit cost, $8,000. For delivery this month.
[25] Approximate cost flat cars, $540,000; box car, $1,750,000. Flat cars for delivery in October; box cars, during third quarter of this year.
[26] Deliveries of box cars expected to be completed by end of first quarter of 1956. Covered hoppers to be delivered by end of 1955.
[27] To cost over $10,000,000. Deliveries to begin in October.
[28] Cost, $8,250,000.
[29] For December delivery.
[30] Delivery expected during third quarter of this year.
[31] To be equipped with Timken roller bearings. Estimated cost, $3,300,000. Delivery scheduled for October.
[32] Approximate cost, $2,240,000. The cars (air conditioned for suburban service) will be basically similar to the 16 recently delivered to the C&NW. Performance of the recently delivered cars, and commuter reaction to them, has been studied, and as a result minor modifications will be made in the design of the

(Continued on page 18)

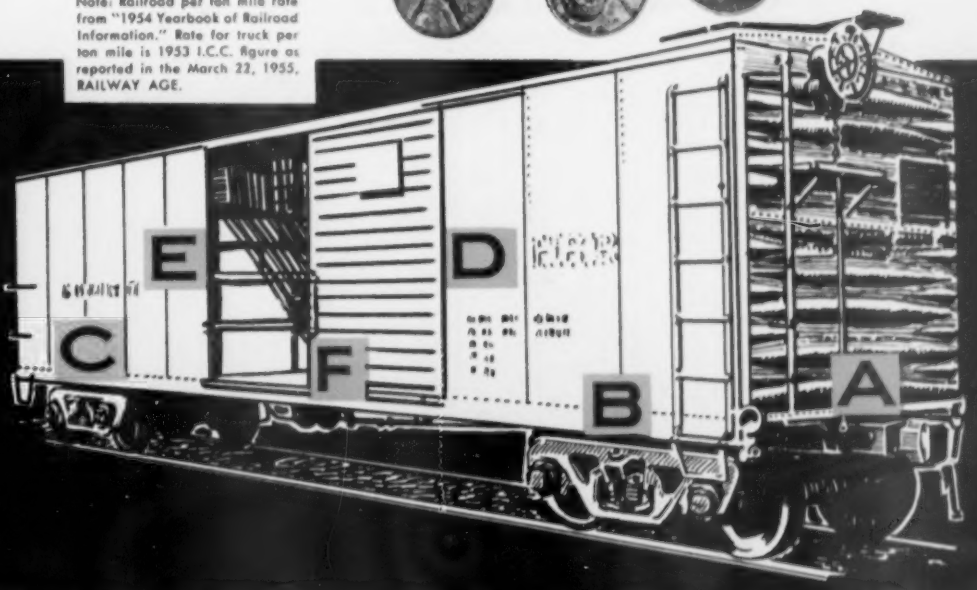
RAILROADS average $.01478 per ton mile

TRUCKERS, carrying premium freight average $.0572 per ton mile

(Almost 4 times what the railroads get)

Note: Railroad per ton mile rate from "1954 Yearbook of Railroad Information." Rate for truck per ton mile is 1953 I.C.C. figure as reported in the March 22, 1955, RAILWAY AGE.

Win back this Premium Traffic with the



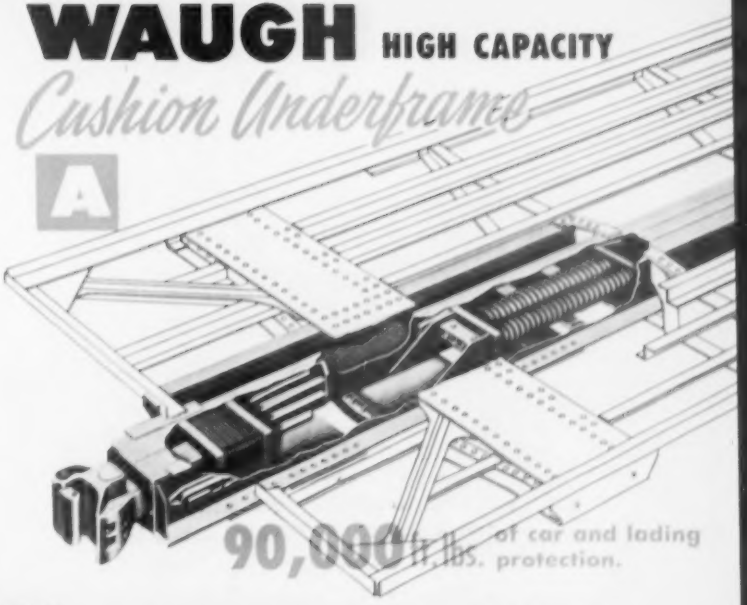
'PREMIUM' CAR

- A Cushion underframe
- B Improved trucks
- C Improved bearings and lubrication
- D Wide doors
- E Load retainer
- F Heavy surfaced floor

At the 1953 average per ton mile of $.01478, it is estimated that the average freight car earns $13.91 per working day. With truckers, hauling premium freight, able to average $.0572 per ton mile, almost four times the railroad per ton mile rate, is it too much to assume that the premium car, hauling premium freight, could earn at least twice the present railroad average? On this assumption, the premium car would practically amortize the extra cost in six months time!*

*150 (working days) times $13.91 = $2,086.50

WAUGH HIGH CAPACITY *Cushion Underframes*

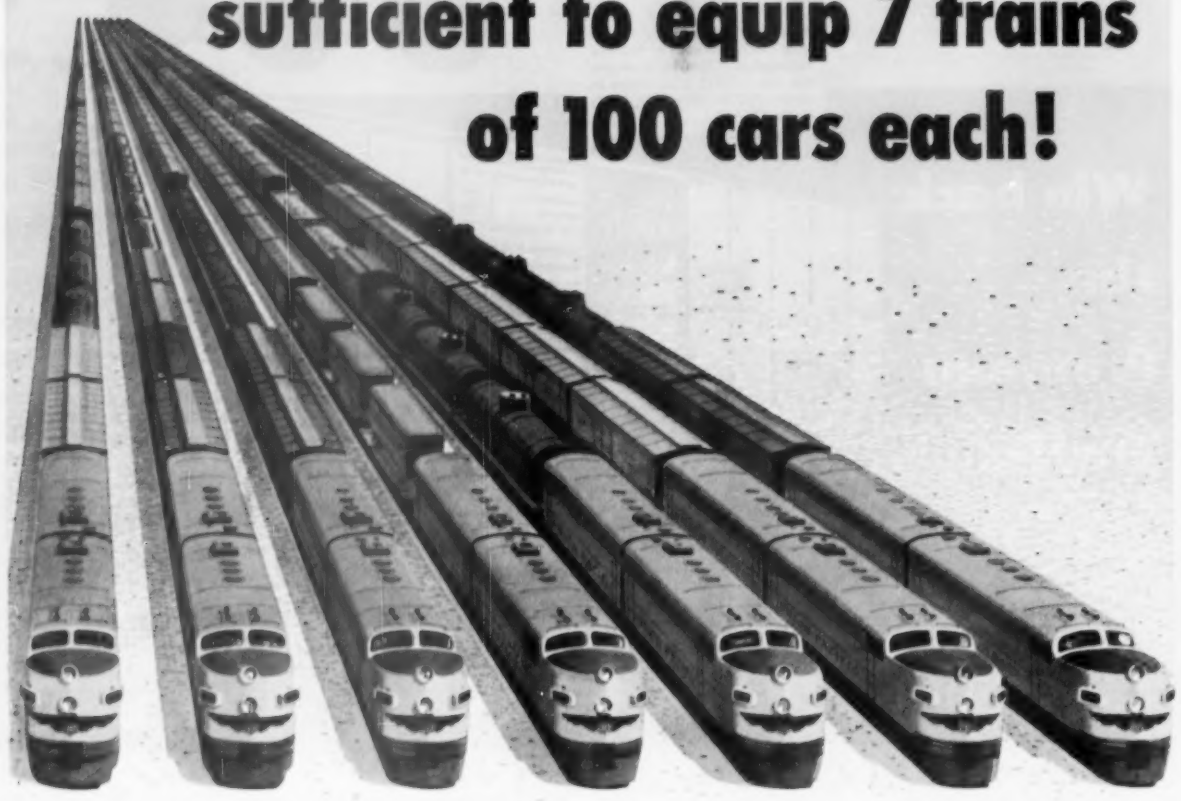


WAUGH EQUIPMENT COMPANY, 420 Lexington Ave., New York 17, N. Y.

Chicago · St. Louis · Canadian Waugh Equipment Company, Montreal

More and more NMB Sealed Journal Box Lubricating Systems† for America's Leading Railroads!

U.P. orders Lubricating Systems sufficient to equip 7 trains of 100 cars each!



Acceptance of the service-proved NMB System is snowballing! Prove to yourself, on your line, that the NMB System gives these vital benefits!

- **PRACTICALLY ELIMINATES BRASS END WEAR**
- **ELIMINATES 81.4%* OF ALL HOT BOXES**
- **REDUCES OIL CONSUMPTION 90%**
- **REDUCES INSPECTION TIME 90%**
- **ELIMINATES VIRTUALLY ALL ACCIDENTS CAUSED BY HOT BOXES**

SEE WORKING MODELS OF NMB SYSTEM AT ALLIED RAILWAY SUPPLY ASSOCIATION EXHIBITION SEPT. 11, 12, 13, 14, SHERMAN HOTEL, CHICAGO

MAKE THIS SIMPLE TEST

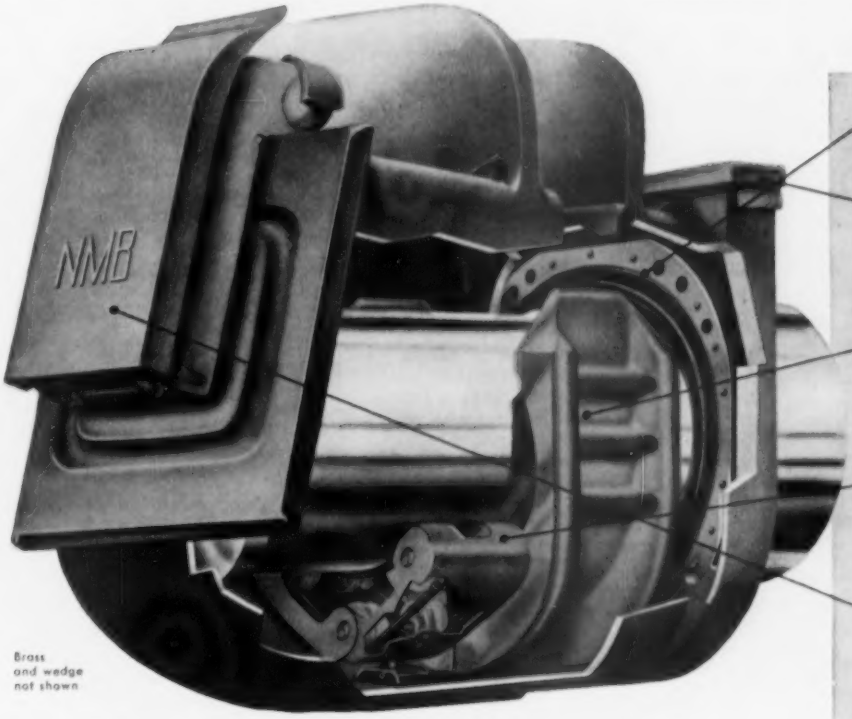
Equip 10 solid bearing cars with the NMB System. Net costs vary, according to journal size, from $232. to $267. per car. Operate under all possible conditions. Bearing end wear will be cut to an unbelievable 0.0006" per 1,000 car miles. Inspection will be needed only once a month. Oil consumption will drop to about 1 oz. per 1,000 journal box miles. Hot boxes will be virtually eliminated!

These predictions are based on actual experience in over 9,000,000 journal box miles of operation by major Class I railroads. This same experience shows cost of the NMB System can be completely amortized in 18 months, and thereafter savings of $6.88 per 1,000 car miles are attainable.

WESTERN PACIFIC · C&O FOR PROGRESS · Rock Island · NH · MAIN LINE Rio Grande

NMB Lubricating System uses "long" solid bearings; is quickly installed without journal box alteration

A.A.R. APPROVED FOR INTERCHANGE SERVICE ON 10,000 CARS



Brass and wedge not shown

5 PRINCIPAL PARTS

A. OIL SEAL. Keeps oil in; dirt, water, brine and snow out.

B. DUST GUARD WELL COVER and FILTER. Exclude dripping water, snow, brine; yet permit breathing.

C. JOURNAL GUARD BEARINGS. Eliminate axle damage during humping, coupling, starting or heavy braking.

D. OIL CIRCULATOR. Lubricates bearings with ½ turn of axle. Guarantees continuous lubrication. Bearings run 50° cooler.

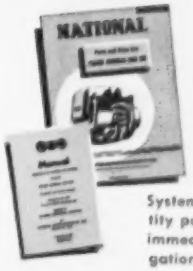
E. JOURNAL BOX LID and WAFFLE GASKET. Provide tight oil and water seal at front opening. Eliminate vibration wear.

The NMB Sealed Journal Box Lubricating System†

is the result of applying modern automotive engineering principles to a century-old railroad problem. Developed by NMB in collaboration with 3 major western railroads, the NMB System provides modern, sealed oil bath lubrication and exclusion of foreign matter from solid bearing journal boxes.

Installation is made in the standard A.A.R. journal box. No alteration is required. Waste packing formerly used for lubrication is eliminated (no waste grabs). NMB Systems for 5" x 9", 5½" x 10" and 6" x 11" A.A.R. standard solid bearing journal boxes can be shipped promptly.

* Based on operating experience of major Class I railroads
† "Patented" and "Patents Pending"



NEW MANUAL describes simple, inexpensive installation steps. **PARTS & PRICE LIST** shows all System parts, gives quantity purchase prices. Sent immediately without obligation.

NATIONAL OIL & GREASE SEALS O-RINGS SHIMS

For complete information or consultation at your headquarters, write or telephone nearest NMB Railway Equipment Division Offices.

New York 17, N. Y.: Room 537, 527 Lexington Ave. PLaza 3-6647
Chicago 4, Illinois: Room 462 McCormick Bldg., 332 S. Michigan Ave., HArrison 7-5163
Redwood City, California: Broadway at National Ave. EMerson 6-3861

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GENERAL OFFICES: Redwood City, California
PLANTS: Redwood City, Downey and Long Beach, California; Van Wert, Ohio

NMB has manufactured tens of thousands of oil seals for roller bearing cars and over 1,000,000,000 oil seals for AUTOMOBILES • TRUCKS • TRACTORS • AIRCRAFT • MACHINES • HOUSEHOLD APPLIANCES

ORDERS AND INQUIRIES *(Continued from page 14)*

second lot, including a change in seating. The study indicated commuter reaction to the new cars has been "highly enthusiastic."

[8] Estimated cost, $164,000. Delivery expected this month.

[9] Cost, $4,000,000. The cars are in addition to 300 previously ordered (page 25, February issue). Delivery of the additional units is expected to begin late in the third quarter of 1955.

NOTES:

Atchison, Topeka & Santa Fe.—The Santa Fe has ordered 50 baggage-car shells from the Pullman-Standard Car Manufacturing Company. Deliveries will begin about December 1.

Erie.—The Erie directors have authorized purchase of 1,000 box cars at an estimated cost of $8,000,000.

Missouri-Kansas-Texas.—The M-K-T directors have authorized purchase of 600 freight cars at an approximate cost of $4,500,000. Included are 150 50½-ft 50-ton double-door box cars; 50 50½-ft 50-ton box cars equipped with damage-free loaders; 300 40½-ft 50-ton box cars; 75 70-ton covered hopper cars; and 25 50-ton flat cars. The flat cars will be built in the Katy's Denison, Tex., shops.

St. Louis-San Francisco.—The Frisco board of directors has authorized purchase of 2,000 freight cars to cost $16,000,000. Included are 700 50-ft box cars; 650 40-ft box cars with 8-ft doors, Nailable Steel Flooring and rubber draft gears; 200 70-ton roller-bearing-equipped covered hopper cars; 200 65-ft drop-end mill-type gondola cars; 100 50-ton 53-ft flat cars; and 150 wood rack cars. The last two lots will be built in company shops and will have cast steel underframes.

Union Pacific.—The UP will apply to 700 freight cars, for $174 a car, the new circulating oil lubricating system developed by the National Motor Bearing Company. The UP installation will be the largest so far by any railroad. The new lubricating system, developed at the instance of the UP as a means of overcoming the hot box problem, and first tested on 10 of the road's fast merchandise cars, was described and illustrated in the January issue, page 11. The 10 cars are now reported to have traveled an average of more than 90,000 miles each, with better than expected results. Journal-box temperatures have been consistently about 50 deg F lower than those with traditional waste pack lubrication on the same trains. Wear on bearings and journals is said to have been only a minute fraction of that in waste-packed boxes, and oil consumption has been reduced about 90%.

PERSONAL MENTION . . . . . .

Atchison, Topeka & Santa Fe

J. H. ARMSTRONG, shop superintendent at Topeka, Kan., retired.

H. V. GILL, superintendent of shops at San Bernardino, Cal., appointed shop superintendent at Topeka, Kan.

V. L. MARLO, master mechanic at Argentine, Kan., appointed superintendent of shops at San Bernardino, Cal.

J. W. LUKE, master mechanic at Chicago, appointed master mechanic at Argentine, Kan.

H. N. CHASTAIN, general supervisor of diesel engines at Chicago, appointed master mechanic at Chicago.

Baltimore & Ohio

A. K. Galloway

ALEXANDER K. GALLOWAY, general superintendent motive power and equipment at Baltimore, retired on August 1. *Born:* St Thomas, Ont., October 1, 1885. *Career:* entered railroad service July 1, 1902, as a machinist apprentice on the Michigan Central. Served as machinist, shop foreman, roundhouse foreman, and general foreman on the MC until November 1, 1914, when he became acting master mechanic on the B&O at Baltimore. Was subsequently general master mechanic at Cincinnati and at Baltimore; district master mechanic at Baltimore; superintendent motive power, Western lines, at Cincinnati, and superintendent motive power at Baltimore. From December 1, 1936, to January 1, 1942, superintendent motive power and equipment on the Reading and Central of New Jersey, with headquarters at Reading, Pa. Then appointed general superintendent motive power and equipment, B&O, at Baltimore, with jurisdiction later extended to include B&O Chicago Terminal and Staten Island Rapid Transit. *Other activities:* chairman, Mechanical Division, AAR, 1948-49.

A. J. LARRICK, regional master car builder at Cincinnati, retired.

R. A. GARRIGUS, general car foreman at Washington, Ind., appointed regional master car builder at Cincinnati.

Canadian National

JOHN G. SPANKIE, material inspector in the research and development branch, retired.

Canadian Pacific

G. E. BALES, locomotive foreman at Smith Falls, Ont., appointed division master mechanic, Montreal terminals.

A. S. LAVALLIER appointed division master mechanic, Farnham (Que.) division.

W. STEWART, district master mechanic, Pacific region, at Vancouver, B.C., appointed assistant to superintendent of motive power and car department at Calgary, Alta., with responsibility for repair schedules on the road's diesel power in the west.

A. T. REYNOLDS, division master mechanic at Calgary, Alta., appointed district master mechanic at Vancouver, B.C.

N. WOOLLEY, general air brake inspector out of Winnipeg, Man., appointed division master mechanic at Calgary, Alta.

D. R. LANGDON, mechanical instructor at Winnipeg, Man., appointed general air brake inspector out of Winnipeg.

Central of Georgia

JOHN R. MOCK JR., car foreman at Columbus, Ga., appointed chief car inspector, Headquarters, Savannah, Ga.

Chesapeake & Ohio

H. M. VISE, general car foreman car department at Huntington, W.Va., appointed assistant to general superintendent car department at Richmond, Va.

E. I. ELLIS, foreman in erecting department at Russell, Ky., appointed general foreman, Russell car shop.

P. R. HUMPHREYS, assistant supervisor work simplification at Huntington, W.Va.,

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
April, 1951	2,996,562	3,702	8,914	12,616	237,521
April, 1952	2,766,313	3,826	7,759	11,585	238,784
1953					
March	2,904,227	2,696	6,077	8,769	331,192
April	2,850,752	3,383	6,435	9,818	290,359
May	3,013,610	5,892	11,433	17,325	173,945
June	2,926,001	8,537	15,296	23,833	122,771
July	2,925,317	9,342	15,775	25,117	116,467
August	2,971,020	8,638	14,160	22,798	130,319
September	2,822,222	6,083	10,195	16,278	173,376
October	3,042,558	3,863	6,493	10,356	293,796
November	2,788,773	1,987	3,404	5,391	517,301
December	2,656,063	1,581	2,550	4,131	642,958
1954					
January	2,583,485	3,082	3,797	6,879	375,561
February	2,445,214	2,953	4,066	7,919	348,370
March	2,658,757	2,196	3,637	5,833	455,813
April	2,570,518	3,079	5,149	8,228	312,411
May	2,713,511	4,416	6,510	10,926	248,353
June	2,662,375	6,597	9,617	16,214	164,202
July	2,678,234	7,956	10,912	18,868	141,946
August	2,696,135	7,568	9,742	17,310	155,756
September	2,614,432	6,740	8,882	15,622	167,355
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,515	3,467	5,982	454,232
December	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,7933	63,197
April	2,787,705	3,471	6,485	9,956	280,002

The MODERN Southern Pacific uses the MODERN Diesel lubricant

GULF DIESELMOTIVE OIL

104 YEARS AGO a small wood-burning locomotive forged the first link in what is now the gigantic Southern Pacific transportation system. Today powerful Diesels thunder over the maze of rails that make up this modern system which serves eight Western and Southwestern states.

Throughout the territory served by a subsidiary, the Texas and New Orleans Railroad, Southern Pacific Diesels are lubricated with Gulf Dieselmotive Oil. This modern Diesel lubricant contributes to better performance, greater availability, and lower maintenance costs on many of our nation's leading railroads.

here's why:

1. Effective detergent action prevents harmful piston ring belt deposits.
2. Base stocks are selected for their ability to help prevent hard deposits on the piston crown and in the ring belt area.
3. 100% solvent refining (removing undesirable constituents) insures greater stability and better bearing protection.

Gulf Sales Engineers, experienced in railroad Diesel operation, are always available to aid you in maintaining high standards of lubrication throughout your system. Consult the telephone directory for the number of your local Gulf office.

GULF OIL CORPORATION • GULF REFINING COMPANY

1822 Gulf Building, Pittsburgh 30, Pa.

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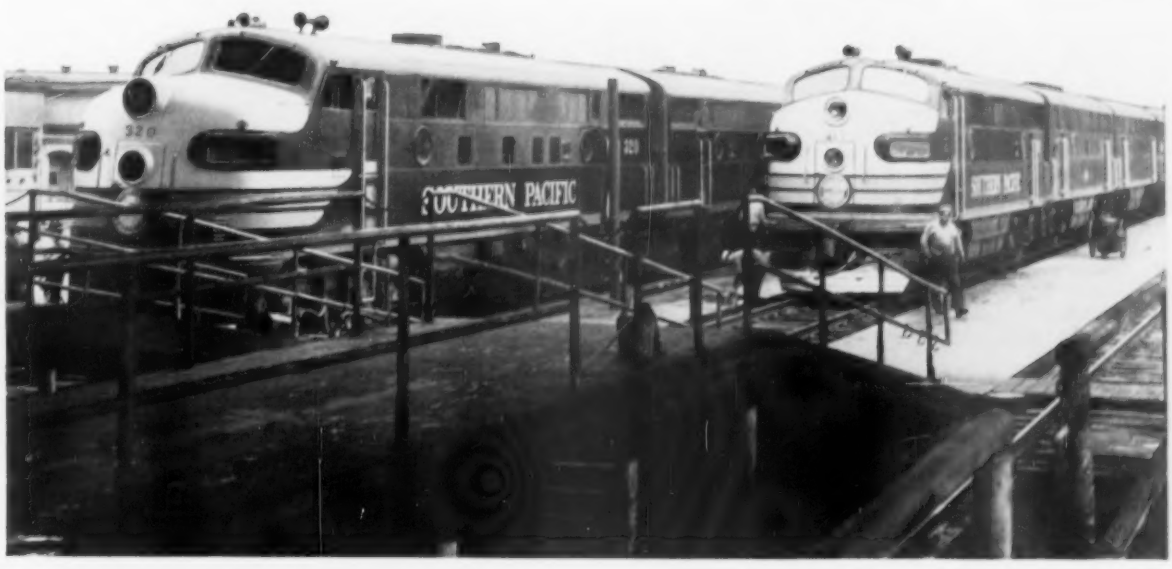
THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS



appointed assistant shop superintendent at Huntington.

T. P. HACKNEY, assistant supervisor of work simplification at Huntington, W.Va., appointed shop engineer at Richmond, Va.

GUY P. GIBBS, assistant general manager, Southern Division, appointed system general manager of motive power and car utilization. Headquarters, Huntington, W.Va.

Chicago, Milwaukee, St. Paul & Pacific

G. H. KOESTER, assistant to superintendent of motive power, appointed mechanical engineer, with headquarters at Milwaukee.

L. H. RABUN appointed master mechanic at Milwaukee.

J. L. BROSSARD appointed master mechanic, Twin City terminals, at Minneapolis.

CARL MCMULLIN appointed district general car foreman at Miles City, Mont.

D. A. RADABAUGH appointed assistant master mechanic at Harlowton, Mont.

Norfolk & Western
Roanoke Shops, Roanoke, Va.

EARLE G. SPEESE, erecting shop foreman, retired.

G. P. BOWMAN, wheel shop supervisor, appointed foreman of erecting shop.

O. H. SUMMERS, JR., test engineer, appointed assistant electrical engineer.

Tulsa, Okla.

W. G. BLANKENBAKER, assistant general car foreman, appointed general foreman, car department.

Southern

ROSCOE H. BIBLE, general foreman car repairs at Meridian, Miss., appointed general foreman car repairs at Knoxville, Tenn.

Spokane, Portland & Seattle
Vancouver, Wash.

C. E. BARNES, general superintendent motive power, retired.

St. Louis-San Francisco
Springfield, Mo.

DUNCAN J. RITCHIE, superintendent motive power, appointed general superintendent motive power.

R. W. EGE, principal assistant electrical engineer, appointed electrical engineer.

W. R. BROWN, assistant electrical engineer, appointed principal assistant electrical engineer.

Obituary

ARTHUR H. KEYS, superintendent car department of the Baltimore & Ohio, died suddenly on July 2. *Born:* Baltimore, Md., September 21, 1899. *Education:* Carnegie Institute. *Career:* Became a messenger on B&O in Pittsburgh on February 13, 1913.

A. H. Keys

Subsequently M.C.B. clerk; car foreman Youngstown, Ohio, and Curtis Bay, Baltimore; general car foreman, Baltimore, Cumberland and Pittsburgh divisions; master car builder, Pittsburgh; assistant superintendent car department, Baltimore, and, beginning April 15, 1948, superintendent car department. *Other activities:* president International Railway General Foreman's Association (1930-37), president Car Department Officers Association (1952-53), New York Railroad Club, Pittsburgh Railway Club, a director of Eastern Car Foreman's Association, and member AAR Mechanical Division Loading Rules Committee.

SUPPLY TRADE NOTES

AMERICAN STEEL FOUNDRIES.—*John A. Rassenfoss* has been appointed manager of the Manufacturing Research Laboratory, and *C. G. Mickelson* and *P. J. Neff* have been appointed assistant managers. The laboratory is a consolidation of the former Research Laboratory and the Process Development Department. It is located in East Chicago, Ind.

■

ALLEGHENY-LUDLUM STEEL CORPORATION.—*Richard J. Swan* has been appointed director of sales, magnetic and electronic materials, and *Milton M. Fenner, Jr.*, has been appointed director of sales, tool and die steels.

■

GENERAL MOTORS CORPORATION.—*Dr. Lawrence R. Hafstad*, physicist and authority on atomic energy, has been appointed director of GM's research division at Detroit. The appointment will be effective later this year.

■

ACF INDUSTRIES, INC.—*Rudolph Furrer*, vice-president, has been placed in charge of manufacturing and engineering for the parent company and has been named president of the Nuclear Energy Products division. *John E. Angst*, district sales manager of American Car & Foundry division, and *Ellsworth B. Carpenter*, western sales manager of that division, have been appointed vice-presidents, sales, at Chicago and St. Louis respectively. *Harry R. Cole*, assistant works manager, of the St. Louis Car plant of the American Car & Foundry Division, has been appointed works manager.

■

WILSON ENGINEERING CORPORATION has opened a new general office at 6 N. Michigan ave., Chicago.

■

PENNSYLVANIA SALT MANUFACTURING COMPANY.—*William P. Drake*, executive vice-president, succeeds *George B. Beitzel* as president.

■

GRIP NUT COMPANY.—*C. A. Henrickson*, sales engineer for the Grip Nut Company, has changed his headquarters from Minneapolis to Milwaukee, but will continue to service the Minneapolis-St. Paul area.

■

AMERICAN BRAKE SHOE COMPANY.—*William J. Grant* has been appointed southern sales manager for railroad products for three company divisions—National Bearing, Southern Wheel and Brake Shoe & Castings. Mr. Grant will continue to be located in Norfolk, Va. He was previously manager of southern sales for National Bearing division.

PYLE-NATIONAL COMPANY.—*Harold R. Weibel* has been named district manager of railroad and industrial sales at St. Louis, succeeding *R. P. Underwood*.

■

RAIL & INDUSTRIAL EQUIPMENT CO.—*John N. Hartman* has been appointed superintendent of tank car repairs at Landisville, Pa. *B. Porter Kuszmaul* has been appointed sales and promotion manager, with headquarters at 30 Church street, New York. Mr. Hartman was formerly superintendent of tank car repairs for the Shippers' Car Line at Milton, Pa.

■

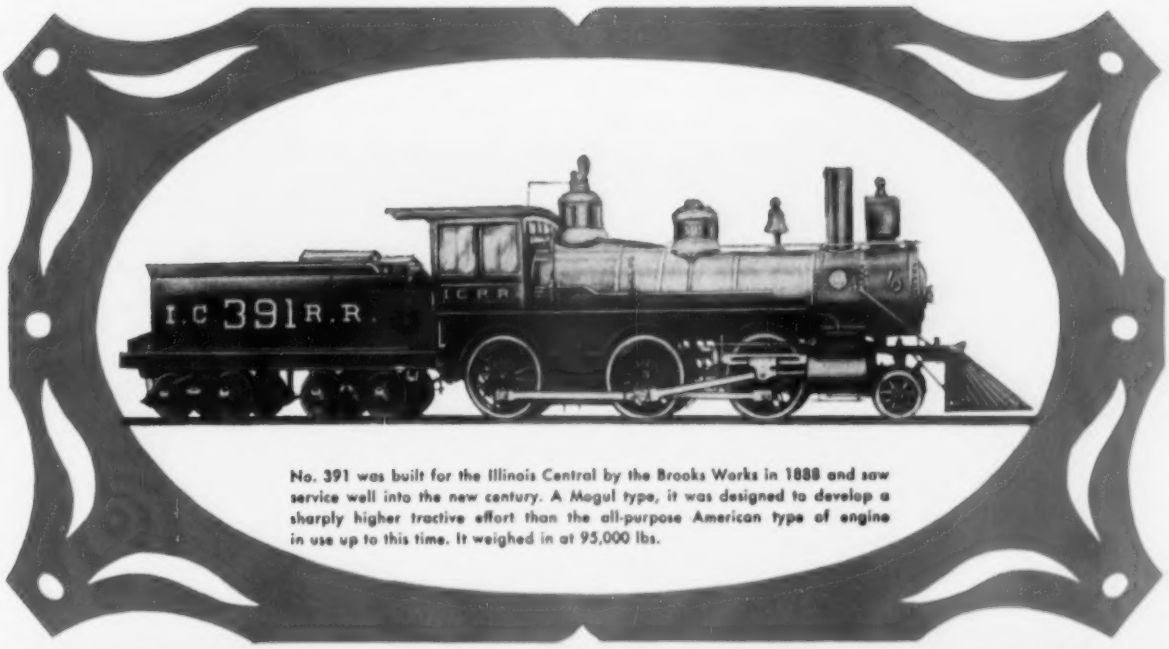
NATIONAL MALLEABLE & STEEL CASTINGS CO.—*J. Lyle Thomas* has been named sales manager, Railway division, in Richmond, Va., succeeding *John R. Kingman*, recently advanced to the company's general offices in Cleveland, on special assignment with the Railway division.

Mellor W. Stevenson has been appointed sales manager of the division at the St. Louis office—1420 Ambassador building. Mr. Stevenson was previously located at Chicago.

■

YOUNGSTOWN SHEET & TUBE CO.—*Richard J. Stamberger*, sales representative at New York, has been appointed assistant New York district sales manager.

(Continued on page 109)



No. 391 was built for the Illinois Central by the Brooks Works in 1888 and saw service well into the new century. A Mogul type, it was designed to develop a sharply higher tractive effort than the all-purpose American type of engine in use up to this time. It weighed in at 95,000 lbs.

Then...and now...serviced with Esso Railroad Products

Valuable years of experience in research and development, along with continual testing on the road and in the lab, stand back of the outstanding performance of famous Esso Railroad Products.

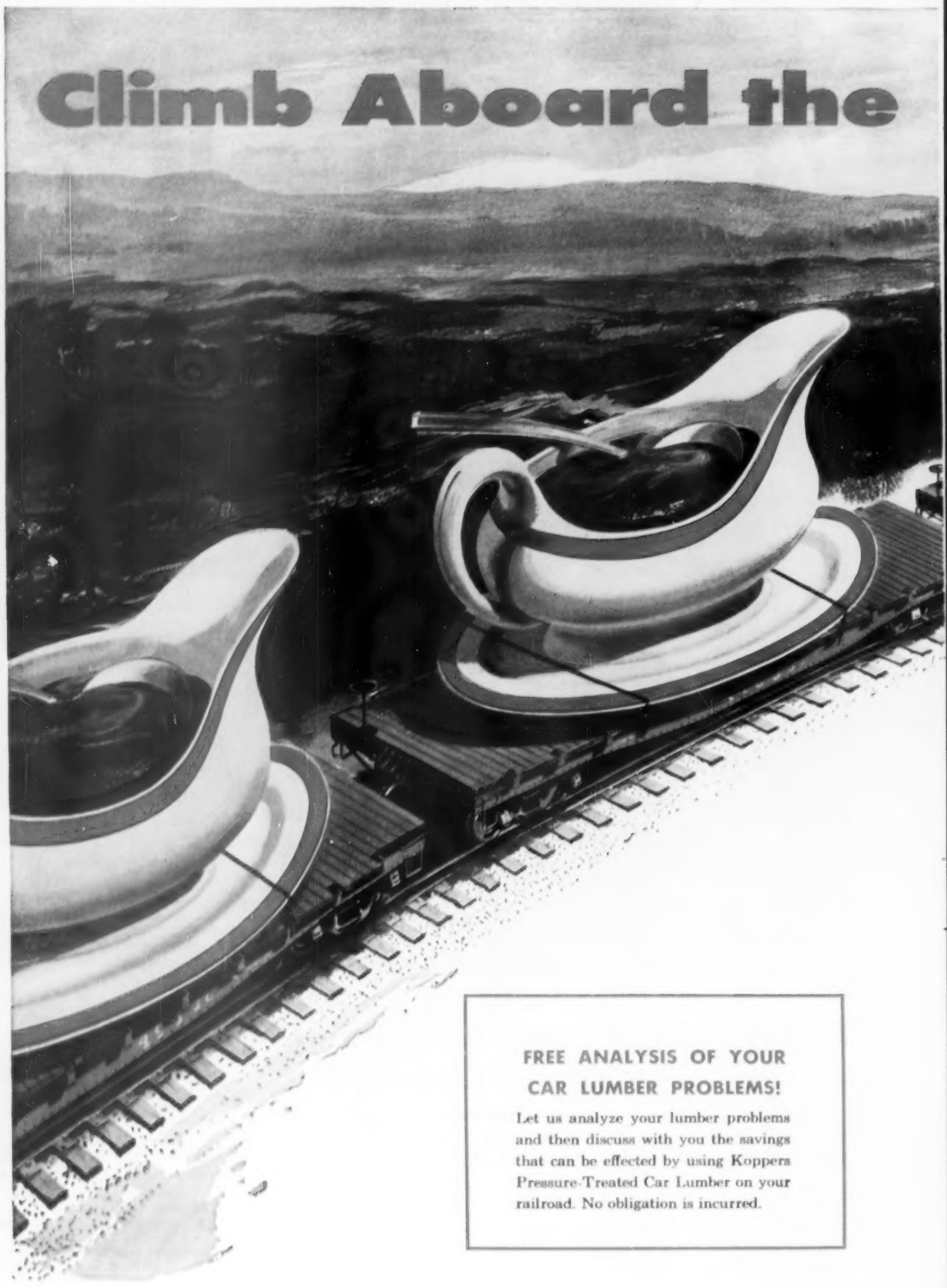
Diesel Fuels
ESSO ANDOK Lubricants—versatile greases
ARACAR—journal box oils
ARAPEN—brake cylinder lubricant
ESSO XP Compound—hypoid gear lubricant
DIOL RD—Diesel lube oil
COBLAX—traction motor gear lube
VARSOL—Stoddard Solvent
SOLVESSO—Aromatic solvent
ESSO Weed Killer
ESSO Hotbox Compound
AROX—pneumatic tool lube
CYLESSO—valve oil
ESSO Journal Box Compound
Asphalt
Cutting Oils
Rail Joint Compounds
Maintenance of Way Products
Signal Department Products
RUST-BAN—corrosion preventive

ESSO

RAILROAD PRODUCTS

SOLD IN: Maine, N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.

ESSO STANDARD OIL COMPANY — Boston, Mass. — Pelham, N. Y. — Elizabeth, N. J. — Bala-Cynwyd, Pa. — Baltimore, Md. — Richmond, Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — New Orleans, La.



FREE ANALYSIS OF YOUR CAR LUMBER PROBLEMS!

Let us analyze your lumber problems and then discuss with you the savings that can be effected by using Koppers Pressure-Treated Car Lumber on your railroad. No obligation is incurred.

Get a 10-year free ride with

Koppers Pressure-Treated Car Lumber

What happens when two new flatcars start out in life together—one with *untreated* wood members, and the other with *pressure-treated* wood members?

In five years, according to railroad records, the untreated car will usually be sidetracked for costly repairs to the lumber.

On the other hand, the car using *treated* lumber will just be "getting warmed up" when it reaches the same five-year mark. Seventeen months later, it will be at the break-even point. In other words, these extra months of service will have paid for the somewhat higher original cost of the pressure-treated lumber.

From then on it's all gravy!

From then on—in fact for the next ten years or more*—you get a "free ride" in respect to maintenance costs and out-of-service losses caused by decay damage. These revenue-cutting items are *eliminated* by constructing or repairing cars with Koppers Pressure-Treated Lumber.

**Seventeen years is the average service life for Pressure-Treated Car Lumber.*

KOPPERS COMPANY, INC.

Wood Preserving Division, Pittsburgh 19, Pennsylvania

KOPPERS®

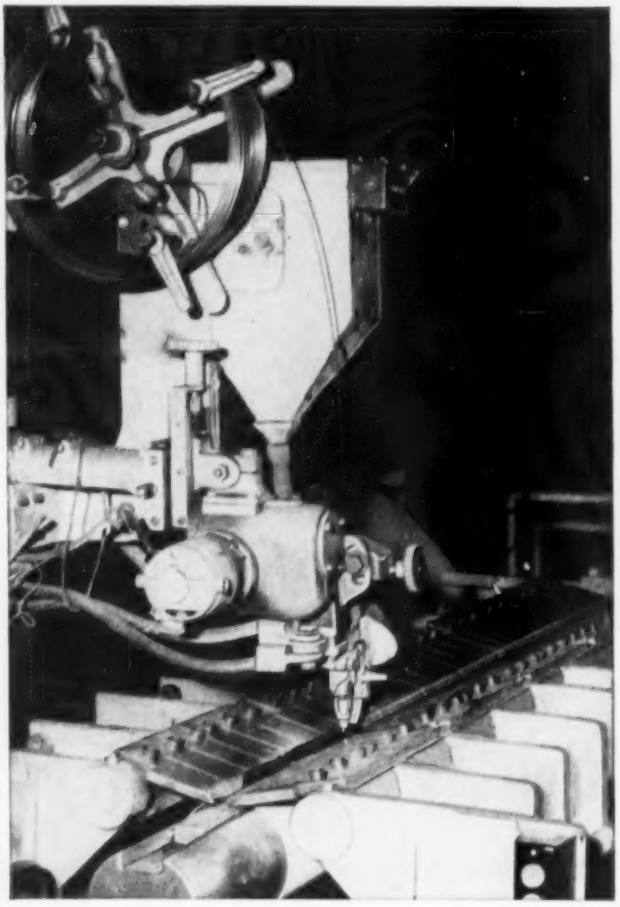
PRESSURE-TREATED CAR LUMBER

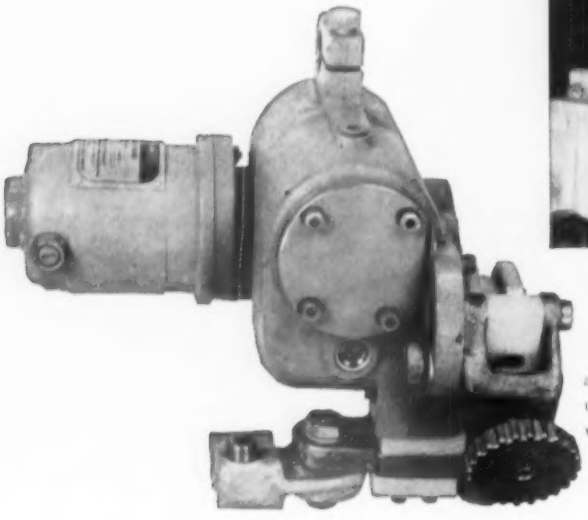
CUT *maintenance costs on tough welding jobs with the* New UNIONMELT DSH *welding head*

Trade-Mark

Here's the low cost, submerged melt welding head that saves maintenance costs on tough welding operations. The new UNIONMELT DSH head combines the flexibility of the lighter units with the ruggedness needed in heavy-duty welding machines. Large, sturdy gears and bearings give long, trouble-free service though work may involve frequent starts and stops and feeding heavy electrode wire. Simple controls and mounting arrangements make the DSH head easy to operate and maintain.

UNIONMELT welding joins thin metals at speeds up to 200 in. per minute or makes one-pass welds with a 3-inch penetration if desired. If you have a production job in your plant that requires high-quality welds made at high speeds, ask your nearest LINDE Office today for more information about UNIONMELT welding. A LINDE Engineer will be glad to help you plan your UNIONMELT installation for high-speed, production welding.





With the new UNIONMELT DSH head now available in five output speeds, you can select the best unit you need for making high-quality low-cost welds at the highest welding speeds.

RAILROAD DEPARTMENT

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities

In Canada: LINDE AIR PRODUCTS COMPANY
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(formerly Dominion Oxygen Company)

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol . . .

New!

TEXTITE

AIR SEPARATOR

CLEAN DRY AIR FOR ALL AIR LINES

New! **Safety for AIR BRAKE EQUIPMENT**

Wet and dirty air passed into train lines during charging endangers the safe operation of rolling stock brake equipment. Eliminate slow release, stuck or frozen brake cylinders.

New! **Reliability for OPERATING SCHEDULES**

Schedules are delayed when air supply lines freeze. This greatly increases charging time and the possibility of delayed schedules. Air thoroughly dried and cleaned by TEXTITE SEPARATORS eliminates these hazards.

New! **Higher Quality WORK**

Air tools are not efficient when dirty, wet air is used. Work spoilage results in many instances. Supply CLEAN, DRY AIR with a TEXTITE —get top efficiency from air tools.

New! **Lower MAINTENANCE**

Eliminate maintenance costs, repairs and replacements on air tools, dirty, wet air supply; lubricants washed from moving parts causing wear; dirt, scale and rust damaging seals and finishes all cost money. TEXTITE saves cost . . . saves jobs . . . saves tools!

- No Filtering Elements to Clean or Replace
- No Replacement Parts
- Self Cleaning
- Positive Separation of Water and Dirt
- No Moving Parts to Wear
- No Re-evaporation
- No Maintenance Cleaning
- No Adjustments

CHICAGO RAILWAY EQUIPMENT CO.

C-6

332 S. Michigan Ave. Chicago 4, Ill.

matched men, machines and

materials build cars for the

GREAT AMERICAN RAILWAY *System*

You can see them wherever you go—the PS-1 Box Cars, PS-2 Covered Hopper Cars and the PS-3 Hopper Cars "built to serve best on the Great American Railway System.*"

Their outstanding performance is the result of car building which matches men, machines and materials.

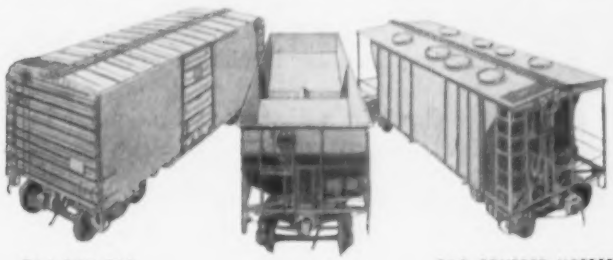
Trips through the vast Pullman-Standard freight car shops at Butler, Pa., Bessemer, Ala. and Michigan City, Ind., convince railroad executives of the unsurpassed quality and economy advantages effected by this unusual combination of production facilities.

By applying the skills of specially trained craftsmen to specific operations, better workmanship is assured. By utilizing job-designed tools, dies and jigs at each phase, more economical production is obtained. And by combining these elements with research tested materials, rugged strength, without weight penalties, is provided.

The in-service reports by Pullman-Standard field engineers prove the ability of these cars to earn more ton miles of revenue at lower cost per year of service. If you are interested in the modern trend in freight cars, write for a copy of the booklets describing the PS-1, PS-2 and PS-3.

*A typical box car moves, in one year, on 39 different roads, including two or more trips on 24 roads. (A.A.R. data)

Built to serve best on the
GREAT AMERICAN RAILWAY SYSTEM



PS-1 BOX CAR

PS-3 HOPPER CAR

PS-2 COVERED HOPPER

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

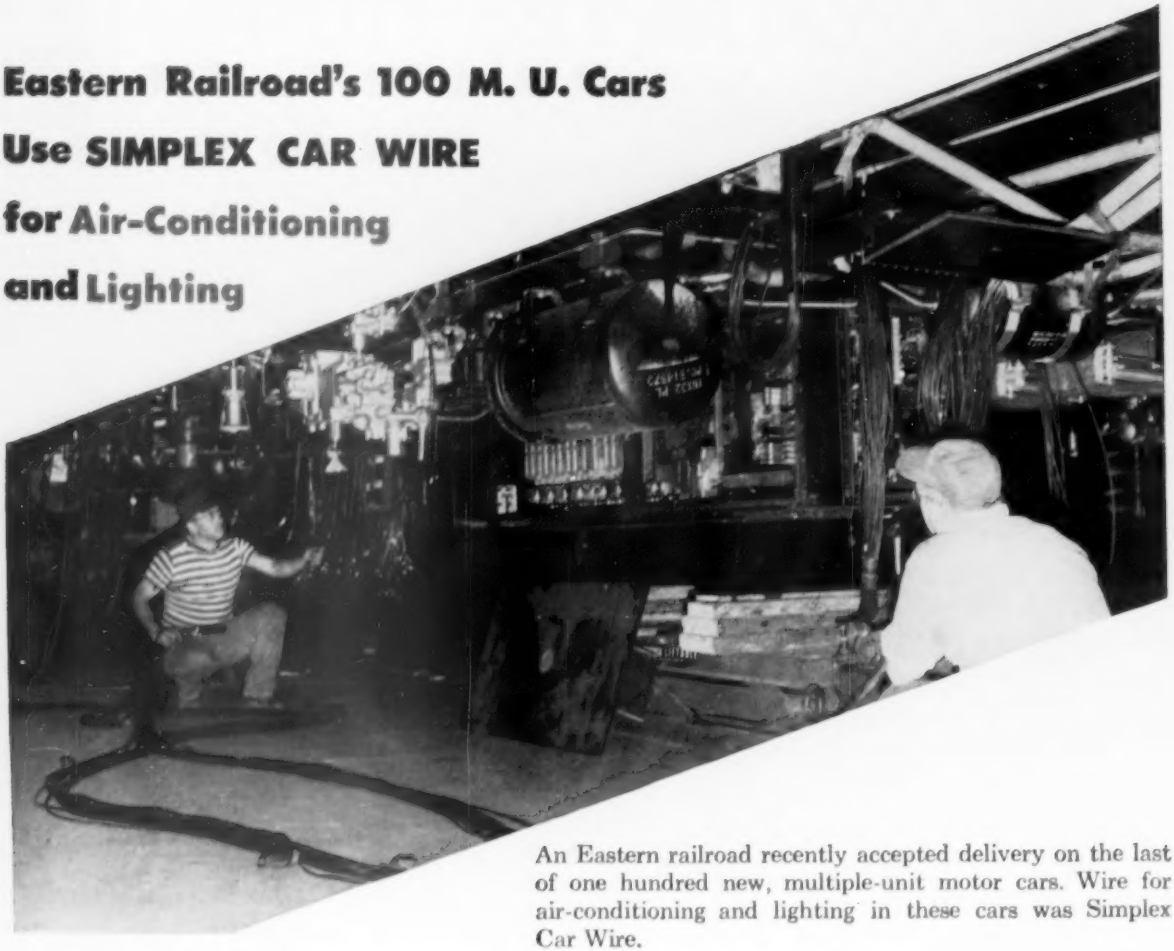
CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

79 EAST ADAMS STREET, CHICAGO 3, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

Eastern Railroad's 100 M. U. Cars Use SIMPLEX CAR WIRE for Air-Conditioning and Lighting



An Eastern railroad recently accepted delivery on the last of one hundred new, multiple-unit motor cars. Wire for air-conditioning and lighting in these cars was Simplex Car Wire.

WHY?

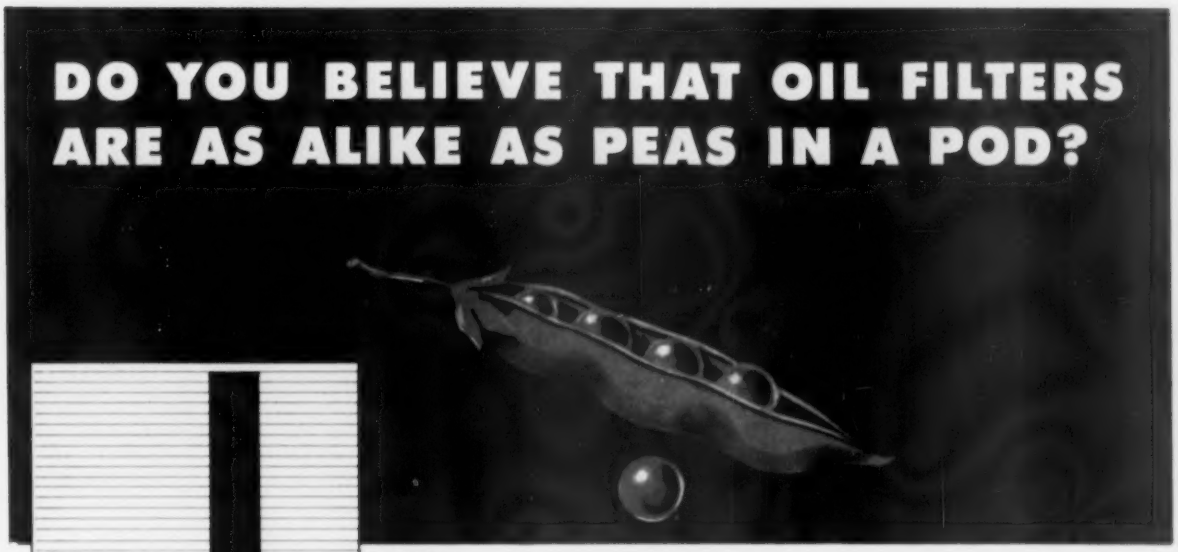
1. Simplex Car Wire, with a smooth, snag-free, tough neoprene jacket, pulls through conduits with ease.
2. Simplex Car Wire, because of its small diameter, is very flexible and easy to handle.
3. Simplex Car Wire's free-stripping construction saves time in terminating.
4. Special Simplex rubber insulation on this wire resists oxidation.
5. Simplex Car Wire withstands vibration, and resists abrasion, acids, and oils. It keeps physical and electrical properties in spite of intense heat and moisture.

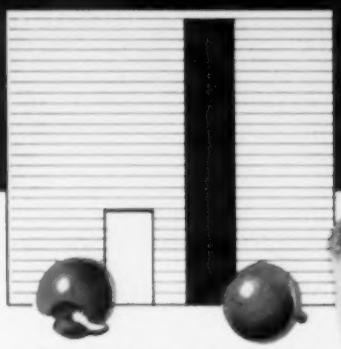
Simplex CAR WIRE

Want to know more about Simplex Car Wire? Then write to the Railroad Department at the address below. No obligation, of course.

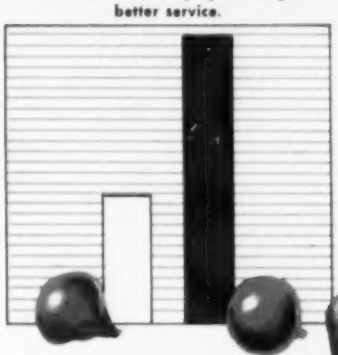
SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

DO YOU BELIEVE THAT OIL FILTERS ARE AS ALIKE AS PEAS IN A POD?

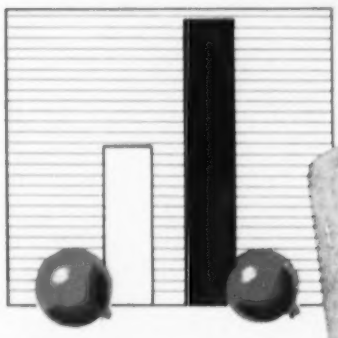




Filter cartridges may have "worm holes" too. Because WIX Cartridges don't channel, they give longer, better service.



When a cartridge collapses in service, its performance drops. WIX density is electronically controlled.



"Look alikes" may not perform alike. Field and laboratory tests prove that WIX Engineered Filtration makes dollars do more work.

THE PROBLEM OF *KEEPING OIL CLEAN* IS IMPORTANT—DOUBLE CHECK FILTERS!

Engineered Filtration goes deep into the technical aspects of oil filter cartridges to deliver the outstanding performance you enjoy with WIX products. WIX Cartridges are handsome, yes . . . but their efficiency, long service and dependability show up most clearly on the balance sheet. The protection WIX delivers to your engines makes the big difference.

Whether the problem is filtering diesel fuel or lubricating oil, WIX's complete coverage and WIX Engineered Filtration represent the sound answer for Railroad Diesel Engines and Maintenance-of-Way Equipment. Here's Filtration keyed to YOUR specifications . . . YOUR equipment . . . YOUR type of operation . . . it makes sense and saves money for you!

WIX research and engineering is constantly testing and studying YOUR oil filtration problems—both in the laboratory and in the field. These facilities and this "know-how" is freely available to you.

Write for the complete WIX catalog or for the assistance of WIX engineers on your filtration problems.

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ENGINEERED FILTRATION

WIX CORPORATION • • • GASTONIA • N • C

WAREHOUSE STOCKS IN:

DES MOINES • SACRAMENTO

GASTONIA • NEW YORK • ST. LOUIS

Now **AAR** alternate standard....

A combination of maximum

Spring-mounted guard arm plungers eliminate normal running slack and provide vertical safety interlock.
Resilient knuckle faces provide additional slack-absorption when couplers are in extreme buff position.

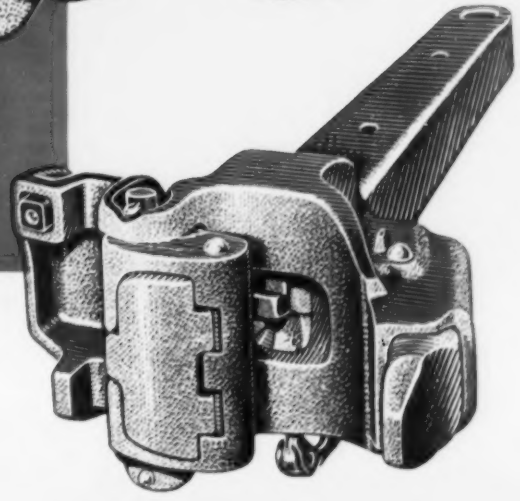
safety at minimum cost... the Controlled Slack Coupler

Fully meets all AAR test specifications

This is important news for the railroad interested in safe, smooth coupler operation...at the lowest possible costs for new passenger cars. Controlled-Slack Couplers are also an ideal application for modernizing existing cars.

Over *2 billion* car and locomotive miles of high-speed passenger train service have provided an excellent record of safety, comfort and smooth train operation.

Controlled-Slack Couplers and Slack Free Yokes can be applied to all passenger cars with standard sill spacing, without need for center sill alterations. *Here's a coupler that offers you a safe, practical way to save money.*



ASF

type E controlled-slack coupler

A contribution to railroad operating economy—through the Research and Development of

AMERICAN STEEL FOUNDRIES

410 North Michigan Avenue, Chicago 11, Ill.

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

NEW CATALOG

OF HARDENED AND GROUND STEEL

PINS AND BUSHINGS

Have within easy reach this catalog of STANDARD SIZES AND STYLES of Ex-Cell-O's long-service-life pins and bushings.

Ex-Cell-O heat treatment gives an extremely hard surface for wear resistance, a tough ductile core to withstand shocks and vibration. Over 200 railroads and equipment builders depend on Ex-Cell-O hardened and ground steel Pins and Bushings.

SEND FOR IT

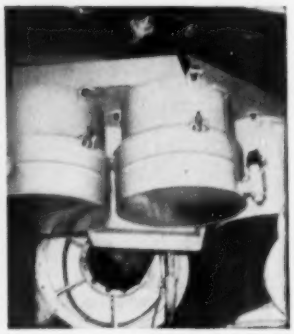
Write to Ex-Cell-O for Bulletin 32559

XLO
EX-CELL-O
Hardened and Ground Steel
RAILROAD PINS AND BUSHINGS
For Diesel and Steam Locomotives and Tenders . . . and Passenger and Freight Cars
RAILROAD DIVISION
EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

Railroads find that AIR-MAZE oil bath filters...

DOUBLE POWER ASSEMBLY LIFE, REDUCE FILTER MAINTENANCE— PAY FOR THEMSELVES IN A YEAR!

A 2 manifold, 4 element Air-Maze oil bath filter in use on Fairbanks Morse 2000 horsepower locomotive.



Air-Maze oil bath filter on ALCO 1500 horsepower road freight locomotive.

TO CUT diesel locomotive maintenance, railroads are starting the switch to Air-Maze oil bath air filters. Already more than forty railroads are using them! One road has twenty-eight diesels using this most advanced method of filtration. And reports show that Air-Maze oil bath air filters *double*, sometimes *triple* power assembly life!

Air-Maze oil bath air filters cut *filter* maintenance, too—go at least three months without servicing. That's up to 24 times longer than panel-type filters!

Savings from both *engine* and *filter* maintenance pay for the cost of the filter in a year!

Air-Maze oil bath air filters clean air thoroughly because they scrub air in a bath of oil. And an oil-washed screen traps any remaining dust, passing only clean, oil-free air. This type of filter not only provides longer periods without servicing but, more important, extends power assembly life, reduces down-time, lowers engine maintenance costs. For further information, call on us or see your locomotive builder. The Air-Maze Corp., 25000 Miles Ave., Cleveland 28, Ohio.

AIR-MAZE OIL BATH FILTER MODELS AVAILABLE FOR THESE LOCOMOTIVES

MFR.	HP	SERVICE	MFR.	HP	SERVICE
Electromotive	800-900	Switcher	Alco-GE	2250	Rd. Switch
Electromotive	600	Switcher	Alco-GE	2250	Rd. Pass.
Electromotive	1000	Switcher	GE-Cooper Bess.	600	Switcher
Electromotive	1200	Switcher	B-L-H	800	Switcher
Electromotive	2000	Rd. Pass.	B-L-H	1000	Switcher
Electromotive	2250-2400	Rd. Pass.	B-L-H	1200	Switcher
Electromotive	1350	Rd. Freight	B-L-H	1500-1600	Rd. Switch
Electromotive	1500-1750	Rd. Freight	B-L-H	1500-1600	Rd. Freight
Electromotive	1500-1750	Rd. Switch	F-M	1000-1200	Switcher
Alco-GE	900	Switcher	F-M	1500-1600	Rd. Switch
Alco-GE	1000	Switcher	F-M	2000	Transfer
Alco-GE	1500-1600	Rd. Switch	F-M	2400	Trainmaster
Alco-GE	1500-1600	Rd. Freight			

AIR-MAZE The Filter Engineers

AIR FILTERS • SILENCERS • SPARK ARRESTERS
LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

"Specialized" for Diesel-Electric Service

NATIONAL
TRADE-MARK

BRUSHES

DIESEL-ELECTRIC traction motors, generators and auxiliaries involve a combination of service conditions not duplicated in other types of electrical rotating equipment. That's why National Carbon engineers have consistently worked toward specialization of "National" brushes for diesel locomotives.

First, they set about duplicating road-service conditions in the laboratory. Next, they took the product of this continuing research to the railroads themselves. Cooperating with these railroads and with equipment manufacturers, National Carbon has developed a complete line of brush grades *specifically* designed for locomotive service.

• • •

This specialization program has resulted in much longer brush life, improved commutator condition and lower maintenance costs. This explains why far more "National" brushes are used in diesel-electric locomotive applications than all other brands combined! Find out for yourself the easy way. *Try 'em!*

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation.

NATIONAL CARBON COMPANY

A Division of Union Carbide and Carbon Corporation, *30 East 42nd Street, New York 17, N. Y.*

SALES OFFICES: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco

IN CANADA: Union Carbide Canada Limited, Toronto.

IT'S HERE. MECHANICAL

An answer to the problem that has long plagued the diesel maintenance departments. It's the TORMAN Traction Motor Disconnect Switch. Inspection of traction motor leads is now just a matter of *minutes!* . . . and there is a Torman disconnect switch designed to fit *all* present equipment. Its positive-locking mechanical pressure eliminates problems such as loose or hot connections due to road shocks . . . and because it is a self-contained weatherproof unit, grounds are a thing of the past.

There are no bolts or wrappings to contend with . . . no auxiliary parts . . . just mount the unit with four bolts—insert the generator and motor leads—pull handle to "latch" position. Unit is now locked and ready for operation. Several major roads are presently using the Torman disconnect switch with highly satisfactory results on both freight and passenger runs. Check the construction, performance and economy . . . and you'll specify TORMAN!

MAINTENANCE AND INSPECTION

Whether it's an annual check, 30-day inspection, or heavy shop repair . . . the Torman switch will save *hours* of time over the period of a year. From actual tests . . . where it previously took two men at least 1½ hours to disconnect and connect traction motor leads, it now takes one man only 15-20 minutes. It will pay for itself within one year and will last for the life of the locomotive . . . no servicing required.

POSITIVE-MECHANICAL CONNECTION

All contacts are honed, and silver-plated for best possible electrical contact with mechanical pressure applied . . . eliminating loose or hot connections. When the handle is latched in closed position, it *positively* locks leads in place. *All* steel parts are cadmium plated and aluminum parts black anodized to prevent corrosion . . . another Torman "life-time" feature.

FITS PRESENT EQUIPMENT

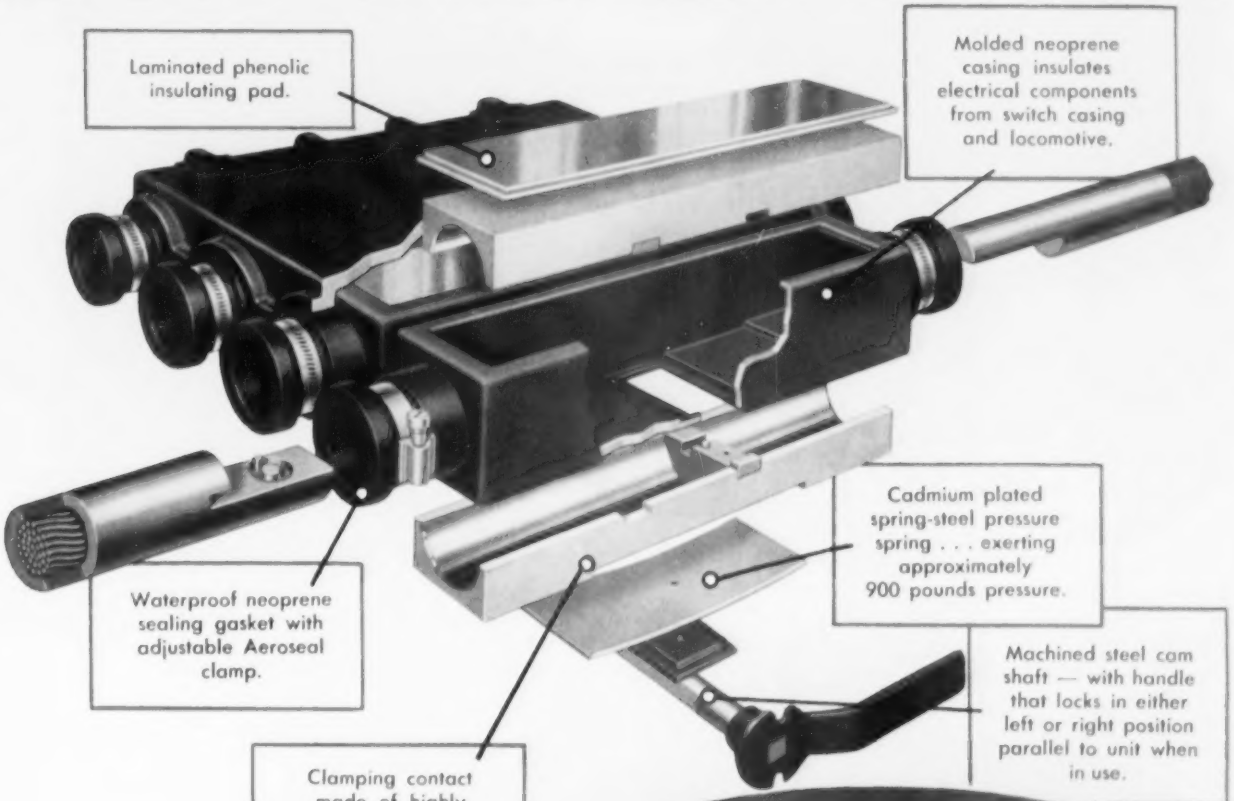
There's a Torman unit to fit every piece of equipment . . . and it is designed so it can be mounted to the locomotive underframe using the present bolt locations. Present clasp connections on motor leads will fit the disconnect switch . . . requires no changes on cable leads. Because size and weight are important factors . . . the Torman unit offers the *minimum* . . . approximately 14" square by 4" thick overall . . . and weighs just 48 pounds!

SELF CONTAINED AND WEATHERPROOF

High-speed suctions carrying road bed moisture do not affect the Torman switch. It is self-contained. No taping . . . all electrical contacts are protected by heavy-duty neoprene sealing gaskets, inside and out. There is no possibility of grounds or faulty connections.

. . A TIME-SAVING, PRESSURE, QUICK

DISCONNECT SWITCH!


Laminated phenolic insulating pad.
Molded neoprene casing insulates electrical components from switch casing and locomotive.
Cadmium plated spring-steel pressure spring . . . exerting approximately 900 pounds pressure.
Waterproof neoprene sealing gasket with adjustable Aeroseal clamp.
Machined steel cam shaft — with handle that locks in either left or right position parallel to unit when in use.
Clamping contact made of highly conductive electrolytic copper—silver plated.

WRITE TODAY FOR COMPLETE SPECIFICATIONS AND PERFORMANCE DATA.

TORMAN COMPANY

8119 LAKE STREET • RIVER FOREST, ILLINOIS

chart your own WEATHER CONTROL

Streamlite HAIRINSUL

protects perishables under all conditions

- **LOW CONDUCTIVITY.** Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity — .25 btu per square foot, per hour, per degree F., per inch thick.
- **LIGHT WEIGHT.** Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.
- **PERMANENT.** Does not disintegrate when wet, resists absorption. Will not shake down, is fire-resistant and odorless.
- **EASY TO INSTALL.** Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall sections between fasteners.
- **COMPLETE RANGE.** STREAMLITE HAIRINSUL is available ½" to 4" thick, up to 127" wide. Stitched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings are available.
- **HIGH SALVAGE VALUE.** The all-hair content does not deteriorate with age; therefore has high salvage value. No other type of insulation offers a comparable saving.

Shipments of valuable perishables are at the mercy of extreme temperature changes unless properly protected. Only an efficient refrigerator car insulation can reduce this hazard.

Leading refrigerator car builders recognize this. That is why, for the better part of a century, they have been specifying all-hair insulation. They know that STREAMLITE HAIRINSUL is the one insulation that is fully efficient under all weather conditions — hot or cold — no matter how severe.

Other reasons why car builders specify STREAMLITE —there are more. Write for complete data.

MERCHANDISE MART, CHICAGO 54

SETS THE STANDARD BY WHICH ALL OTHER REFRIGERATOR CAR INSULATIONS ARE JUDGED

NEW! HYATT COMMUTATOR-END TRACTION MOTOR ROLLER BEARING

CHECK THESE ADVANTAGES:

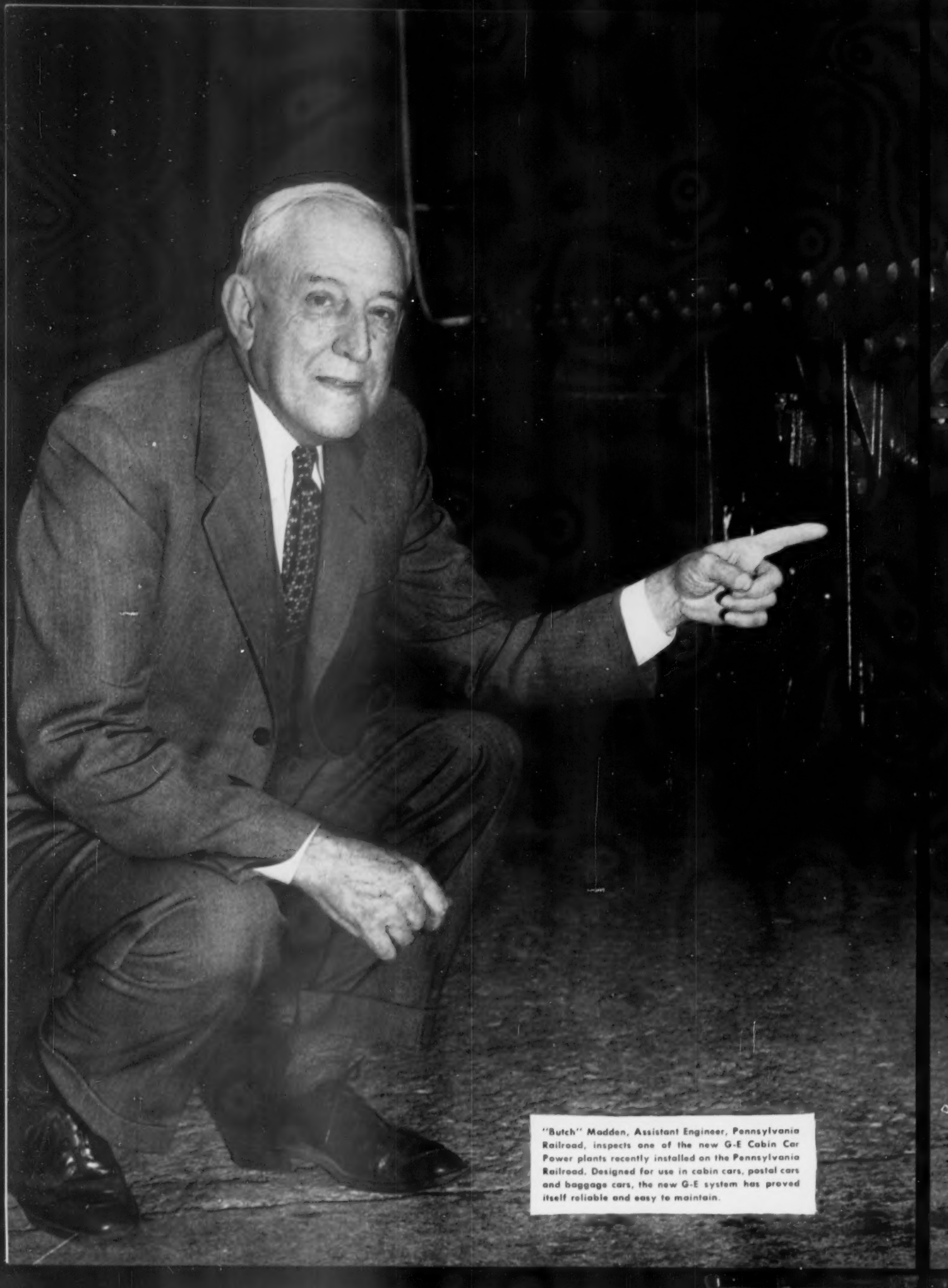
- **No rubbing contact between cages and race flanges**
- **Improved flow of lubrication**
- **New treated, roller-riding, steel cage**
- **Permits inspection of all operating surfaces**

A worthy running mate for the famous Hyatt pinion-end bearing . . . The improved HYATT pinion-end bearing, introduced two years ago, has created a demand for an equally advanced design to replace present commutator-end bearings—*and here it is!* Like its pioneering predecessor, this new HYATT Commutator-End Traction Motor Roller Bearing offers *the combined advantages of a roller-riding cage and maximum-capacity rollers.*

For lower maintenance costs and freedom from breakdowns, *standardize on HYATTS at BOTH ends of your armature shafts!* Hyatt Bearings Division of General Motors, Harrison, New Jersey.

HYATT ROLLER BEARINGS

RUNNING MATE OF FASTER FREIGHT



"Butch" Madden, Assistant Engineer, Pennsylvania Railroad, inspects one of the new G-E Cabin Car Power plants recently installed on the Pennsylvania Railroad. Designed for use in cabin cars, postal cars and baggage cars, the new G-E system has proved itself reliable and easy to maintain.

Pennsylvania Railroad Installs New G-E Cabin Car Power Supply

General Electric's new Cabin Car Power Supply is easier to maintain and is more reliable because:

1. It uses a simple rectified a-c system with an alternator designed specifically for railroad service.
2. The alternator is totally enclosed and completely protected.
3. G.E. has developed a highly simplified control system.
4. The alternator permits the use of standard, low maintenance gear drives.
5. The G-E Cabin Car Power Supply has ample reserve power to meet probable future demands.

Only General Electric has *all* these important features combined in an economical power supply for use in cabin cars, postal cars and baggage cars.

For more information, contact your G-E Apparatus Sales representative or write for bulletin GEA-5865A, General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 115-6A

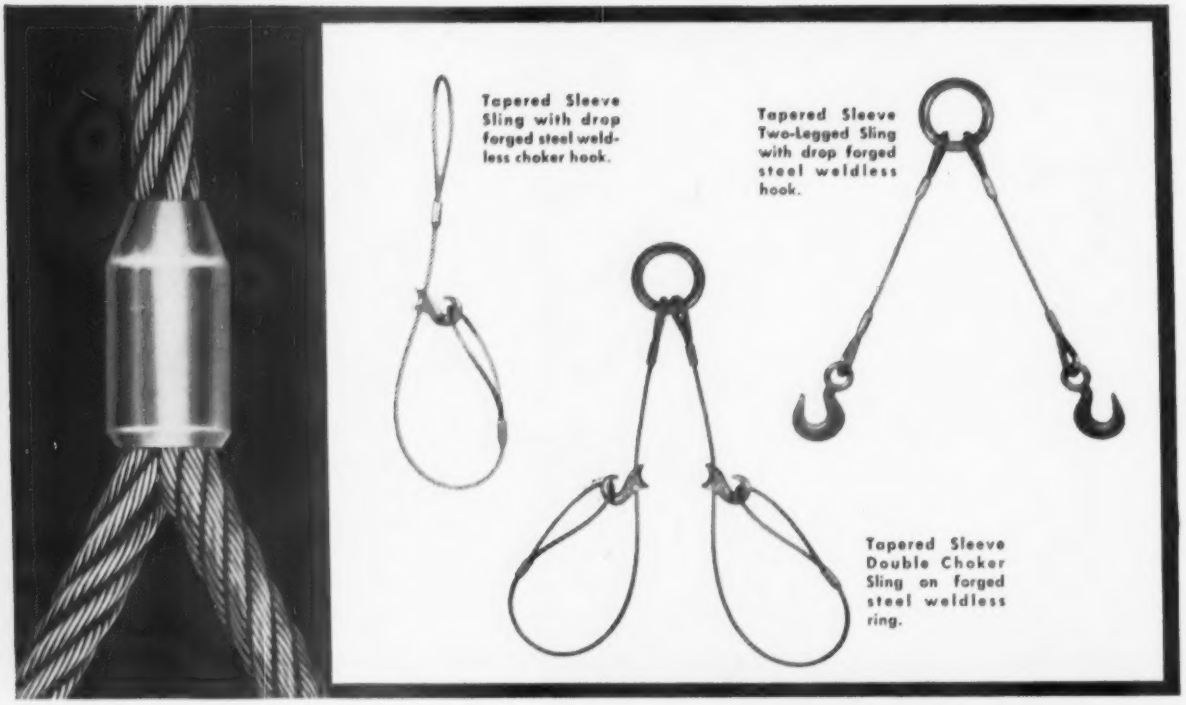
Progress Is Our Most Important Product

GENERAL ELECTRIC

THEY'RE ALL STEEL—RESIST KINKING, CRUSHING—

ROEBLING SLINGS

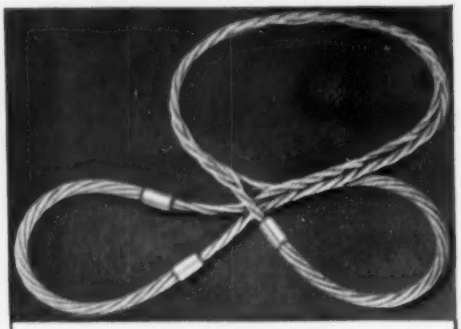
WITH TAPERED SLEEVE


Tapered Sleeve Sling with drop forged steel weldless choker hook.
Tapered Sleeve Two-Legged Sling with drop forged steel weldless hook.
Tapered Sleeve Double Choker Sling on forged steel weldless ring.

ROEBLING SLINGS are made of Preformed "Blue Center" Steel Wire Rope with independent wire rope core. *All steel*, they have top resistance to kinking and crushing . . . are easy to handle all through their working lives. Their tapered sleeve splices are strong as the rope itself and require no allowances.

What's more, the streamlined tapered sleeves won't "hang up" on loads or other equipment. All strand ends are permanently secured beneath the sleeves; no strand or wire ends protrude to cause injury in handling.

Roebling Slings are delivered ready for work. They can be furnished as chokers or in any multi-leg construction with a galvanized steel thimble with attached hook, link or shackle. Write for descriptive folder, and adopt Roebling Slings for new efficiency. John A. Roebling's Sons Corporation, Trenton 2, N. J.



ROEBLING "FLATWEAVE" SLINGS

have some very special advantages. They're extra kink-resistant . . . easy to handle . . . their broad, flat bearing surface protects the load and prolongs sling life. Write for copy of the "Sling Data Book" that describes "Flatweaves" and gives information of real value to every sling user.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6215 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

Standard Engineer's Field Report

CASE HISTORY
PRODUCT Calol Filter Coat
FIRM Milwaukee R.R. Tacoma, Washington

Special adhesive coating increases efficiency of filters up to 50%

THE MILWAUKEE ROAD has used Calol Filter Coat on impingement-type car body and engine air intake filters since 1953, when it was first available to railroads. It proved completely superior to previous oils on these filters, increasing efficiency up to 50%—according to the District Diesel Supervisor. To service the great number of filters in use, the company installed a special production line. Coating process starts with steam and chemical cleaning of filters, then dipping in heated Calol Filter Coat (above). After draining 15 minutes, filters are placed in drying ovens. Calol Filter Coat gives complete protection not only against heavy dirt and dust, but grit from sanding. Even under these adverse operating conditions, Calol Filter Coat did not drip off screens, but maintained its high wicking ability, and kept dust and grit out of engines.

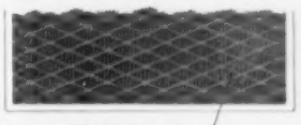
CALOL

TRADEMARK "CALOL" REG. U. S. PAT. OFF.

FREE CATALOG: "How to Save Money on Equipment Operation", will be sent on request to Standard Oil Company of California, 225 Bush St., San Francisco.

FOR MORE INFORMATION about this or other petroleum products, or the name of your nearest distributor, write or call Standard Oil Company of California.

Why Calol Filter Coat ups efficiency of air filters



Will not drip off screens—gives full filtering efficiency through entire service period.

Easily applied and cleaned.

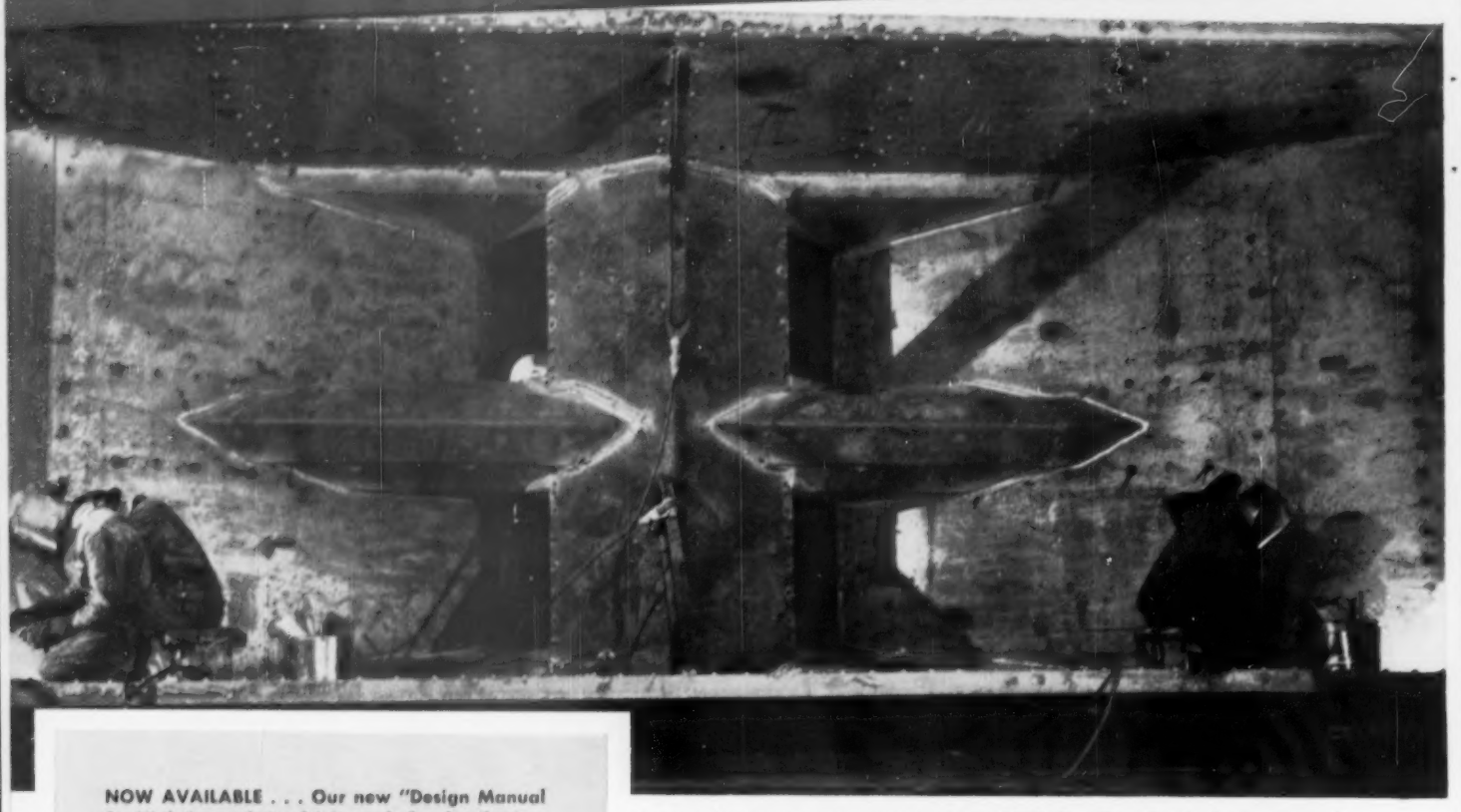
High wicking ability—quickly soaks dust particles.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

USS HIGH STRENGTH STEELS

TWENTY-TWO YEARS OF PERFORMANCE

By reducing corrosion damage in hopper cars



NOW AVAILABLE . . . Our new "Design Manual for High Strength Steels" is ready for distribution. This excellent book contains comprehensive and practical information that you will find extremely useful in designing your product for greater economy and efficiency by the sound use of high strength steels.

* * *

For your free copy, write on your company letterhead giving your title or department, to United States Steel Corporation, Room 4792, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

TO SAVE $570,500 IN MAINTENANCE COSTS USS COR-TEN Steel plates are used throughout in the 652 Virginian 55-ton hopper cars being rebuilt this year. The use of COR-TEN Steel—which has 50% higher yield point than copper steel and 2 to 3 times the resistance to atmospheric corrosion—means that no heavy repairs will be needed on these cars for 20 years. In contrast, copper steel construction would require at least one, and possibly two, heavy repairs during that time. Thus, by using USS COR-TEN Steel plates, at an added cost of only $275 per car, a clear savings in maintenance cost of $875 per car can be confidently expected.

In addition, since the cars built of USS COR-TEN Steel need be repaired only once in their lifetime as compared with two trips to the shops by copper steel cars, the revenue made available by having their cars in serviceable condition can be translated into profits for the Virginian.

COR-TEN Steel construction can pay off big

To reduce maintenance costs and increase service life...

Virginian Railway has made USS COR-TEN Steel a vital part of its car building and rehabilitation program

AFTER TAKING A HARD LOOK at the steadily rising cost of freight car maintenance, the Virginian Railway in 1947 launched a program designed to minimize such costs by using car construction that would increase time between shopping periods.

As a result, The Virginian in the past eight years has used USS COR-TEN Steel in 4872 open-top freight cars and, as part of a continuing program, is at present rebuilding 652 55-ton hopper cars in its own shops with this superior high strength steel.

This important coal carrier chose USS COR-TEN Steel because extensive tests and available records showed the service life of hopper car plates of USS COR-TEN Steel to be 50% to 100% greater than open hearth copper steel. So the Virginian figured that by using COR-TEN Steel in rather large quantities, they could also save money in rather large quantities, in spite of the slightly higher cost of COR-TEN Steel construction.

Here's how Mr. L. W. Doggett, Mechanical Engineer of the Virginian, puts it. "Our present practice when building new hopper cars or making heavy repairs for the first time to existing cars is to make all plates of USS COR-TEN Steel with the sides ¼" thick, upper floor sheets and ends 5/16" thick, and all other plates, including door plates, ⅜" thick. With this construction, we feel that such cars can be kept in regular service twenty years or more before making heavy repairs, after which four years can be added by patching."

The attached table is worth your careful study. It shows how USS COR-TEN Steel construction pays off—at a ratio of more than 3 to 1—in reducing maintenance costs in Virginian Railway 55-ton hopper cars. It is on the basis of such demonstrated greater economy in service that USS COR-TEN Steel has been used in more than 46,000 hopper cars and 32,000 gondolas. Proved economic advantages are the reasons why more than 195,000 freight cars have been built better with USS COR-TEN Steel since 1933. Would you like us to figure how much you could save with such construction?

TYPICAL COST COMPARISON FOR 1000 55-TON HOPPER CARS USING USS COR-TEN STEEL OR COPPER STEEL BODY CONSTRUCTION

CONSTRUCTION COST of 1000 CARS	Cost of heavy repairs* after 12 years at $1150 per car	Cost of heavy repairs* after 20 years at $1425 per car	Cost of heavy repairs* after 24 years at $1150 per car	Total cost of heavy repairs
COPPER STEEL at $5,000 per car $5,000,000	$1,150,000	.....	$1,150,000	$2,300,000
USS COR-TEN Steel at $5,275 per car $5,275,000	.....	$1,425,000	.....	$1,425,000

Additional Cost of USS COR-TEN Steel ...$275,000
Per car....$ 275

Total Repair Saving by USS COR-TEN Steel ..... $ 875,000

*On plates only

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

EDITORIALS . . . . . .

Why Go To Chicago?

The writer of this editorial note has attended a lot of pre-convention committee meetings over the years and has heard many railroad men make the remark that the expected attendance at the annual will be good "if so-and-so is *allowed* to come to the convention ". This raises a real question, "Is it a fact that there are mechanical, and even higher, railroad officers who think they're doing their men a favor by sending them to a convention of technical associations?" If it is a fact that the meetings' papers and discussions are not of sufficiently high caliber that any railroad doesn't get back fifty dollars in maintenance savings for every dollar spent in sending a man, then they're probably sending the wrong man.

The September Coordinated Meetings will be packed with dollar-saving value and if we had more space we could give 14 good reasons why every road should send representatives in proportion to its size. There they will find, by association with 3,500 other people, the one best answer to their latest problem whether it be locomotive, car or shop machinery. The September Meetings will be the central trading post for bargains in "problem solving". A dollar saved in maintenance cost is a dollar increase in net. Good ideas are the dividends of the September Meetings but "you got to go there to get them".

"Volts Times Amps Is Horsepower"

The instructor in the diesel school said, "Suppose we have two 3,000-ton trains on parallel level tangent tracks each hauled by a 3,000-hp diesel-electric locomotive. One locomotive is geared for 65 mph and the other for 85 mph. They will start together and run as fast as their ratings permit." Then he put the question, "Which train will arrive first?"

No one in the class of 51 volunteered an answer, but when the question was put to individuals they would guess one train or the other. After much guessing, supported by some argument, one student said, "They would arrive at the same time." But this theory found no supporters. The guessing went on. It would be one train or the other.

That was four years ago, and you who are reading these lines undoubtedly know that if neither locomotive exceeds limiting current values or permissible motor speeds, the two trains will arrive together. The motors of one locomotive will run more slowly than those on the other and will carry more current, but the product of volts times amperes (divided by 746), which is horsepower, will be the same for both locomotives. There might be minor differences in efficiency in case the higher copper losses in the slow locomotive exceeded the higher iron losses in the faster one but this difference is so small as to be of no practical significance.

The important factor in the present situation is that while the mechanical department men are aware of these fundamentals, it is difficult to impress upon the operating department the facts that too low speeds will damage insulation, and what is perhaps more important, that motor speeds which are too high are not only dangerous but also very bad for commutators and all parts susceptible to vibration and high voltage.

Fortunately, motor and generator designs are being constantly improved and as thermal capacity of machines is increased, the universal locomotive for all classes of service comes nearer to being a reality. But don't let the designers lull you to sleep. Attention to this characteristic of locomotives is still necessary, and spreading of the gospel to those who use them will be reflected in happier conditions in the shop.

What Kind of Trial

A short while back we heard an interesting story that may have become slightly exaggerated in passing from one person to another. It illustrates what many observers feel is a sharp difference in the approach taken by railroads to the acceptance of new ideas and products compared to industry generally. It also raises the interesting question as to which approach is the more desirable.

The story concerns a salesman for a new brand of paint. He called on a railroad mechanical officer who said he would give the paint a trial if the salesman would leave him five gallons as a sample. The salesman did this and was told to come back five years later when he would be told how well his paint stood up.

Five years later the paint salesman returned to see how his paint made out and he was told that it seemed to be all right as far as could be told from a test of such a small sample. In order to learn more about this paint, the railroad man decided to buy another 100 or so gallons. Again the salesman was requested to return in five years to see how his paint made out when applied in larger quantities.

Thus, five years after the larger-scale test was begun and 10 years after the initial test, the salesman returned with the eager expectation that his product would at last be acceptable. But, unfortunately, when he arrived on the scene he found that the man he had been talking to retired two years previously. The new man in the job knew nothing about the test.

So, what was the salesman told that he must do if he wanted to join the railroad's list of suppliers? Leave a five-gallon sample for an initial 5-year test.

Now, this story may not be exactly true in every last detail. And paint is perhaps not the ideal analogy because this is one product on which many railroads run accelerated tests. But it would seem safe to bet that hundreds of incidents quite similar to this in principle happen every year on the railroads. And it raises the question as to whether the railroads generally are overly conservative in accepting new ideas. Do they require

more test information than is economically desirable for the best interests of the industry? Is there room for more accelerated tests within the railroad industry?

Suppose, as an example, you could get 90 per cent as much information from a 30-day accelerated test as from a three-year service test. Now and then a product would slip by the accelerated test, be accepted and put in service only to be found later that it is not suitable for every day railroading. It is also true, of course, that such errors will be somewhat costly.

The big question still remains. Would many products pass an accelerated test that would not be satisfactory for day-in and day-out routine use? Would the premature acceptance of a few such ideas not be a minor expense alongside the potential gain of having money-saving ideas accepted one to three years sooner because of the more rapid completion of accelerated tests?

Letters To the Editor

Life of a Diesel

To The Editor:

The answer to the question concerning the economic life of a diesel-electric locomotive, which was raised in your June issue, depends on many things, but mostly on the concept of railroad management as to what constitutes an economic power unit.

Many people think about locomotives as the Irishman thought of his razor. Pat had a razor that he said he had been using for 40 years. He neglected to explain, however, that the razor had two new blades, and three new handles during his ownership.

Another thing Pat failed to consider was that the new safety razors and electric shavers, had improved safety conditions and had made shaving both safe and easy.

As with razors, so with diesel-electric locomotives, we must consider obsolescence.

There seems to be a general idea that present-day locomotives can give economical service, when properly maintained, for at least 20 years. In fact, they could be perpetuated indefinitely by replacement of component parts, but the economical limit, will, of course, depend upon the rate at which more efficient units of new design are developed.

A few years ago, a leading locomotive manufacturer was discussing this question, and he said his plans were to protect the railroads for at least 20 years on any locomotives manufactured by his company. He explained that he intended to keep available, for a 20-year period, repair parts to replace those that the customer might require.

He further expressed the thought that after 20 years, locomotives of new design would make it undesirable to continue to replace in kind the original equipment.

A recent order of the I. C. C. for establishing "A Uniform System of Accounts for Railroad Companies," reads in part as follows:

"When the cost of renewal of a unit of equipment, exclusive of the expense of dismantling and of repairs of old parts re-used exceeds 50 per cent of the replacement cost new of the kind and class as rebuilt, at the time of rebuilding, the unit shall be considered as rebuilt."

"The rebuilt unit shall be accounted for as an addition and the old unit accounted for as retired from service."

Different roads have different ideas as to whether they should completely rebuild locomotives or whether overhaul costs be held to limits which will avoid their being added to capital account.

The writer's opinion is that the majority of maintenance officers wish to maintain locomotives in kind, hoping that when rebuilding becomes necessary, the service earnings rendered by the unit will justify its replacement with a greatly improved unit of new design.

Regardless of any other consideration the life of a diesel-electric locomotive depends on how it is maintained. Anyone that attempts to operate a diesel-electric locomotive on a plan of extracting locomotive-service-miles without restoring service-miles through proper maintenance is due for a rude shock. To find your locomotive-service-miles account overdrawn is indeed bad.

It has been said, "The future has in store exactly what's placed in store for the future." That idea applies to maintenance of diesel locomotives, and has great bearing on the economic life of a diesel-electric locomotive.

Guy Franklin

Sand Blast for Rails

Los Angeles, Calif.

To the Editor:

I can see little merit in the suggestion by Waves Blackwood in your April 1955 issue, that sand blasting, instead of the usual method of applying sand would be a suitable means of preventing locomotive wheel slip. Consider, for example, a four-unit diesel locomotive with a tonnage train having to start on a heavy grade. The locomotive being equipped with the sanding assembly previously mentioned in the magazine, the sand naturally would be directed to the top surface of the rail. When an attempt is made to start the train, there is a short period of standstill, during which time the sand could cut the rail badly at all places where it is applied. Then the train goes a considerable distance at slow speed, while the sand is being forced to the rail under sand-blasting pressures. The sand would then be digging into the rail surface, resulting in earlier than usual rail change, especially on grades and curves in mountain territory, where the sand would be used most.

Also, we have plenty of trouble keeping sand and brake shoe dust out of our electrical equipment, and I am sure a sand blast under the locomotive would add considerably to this difficulty. It would seem to me, therefore, that the increased rail wear and hazards to both rails and electrical equipment would automatically rule out this method of gaining traction.

S. W. Blake

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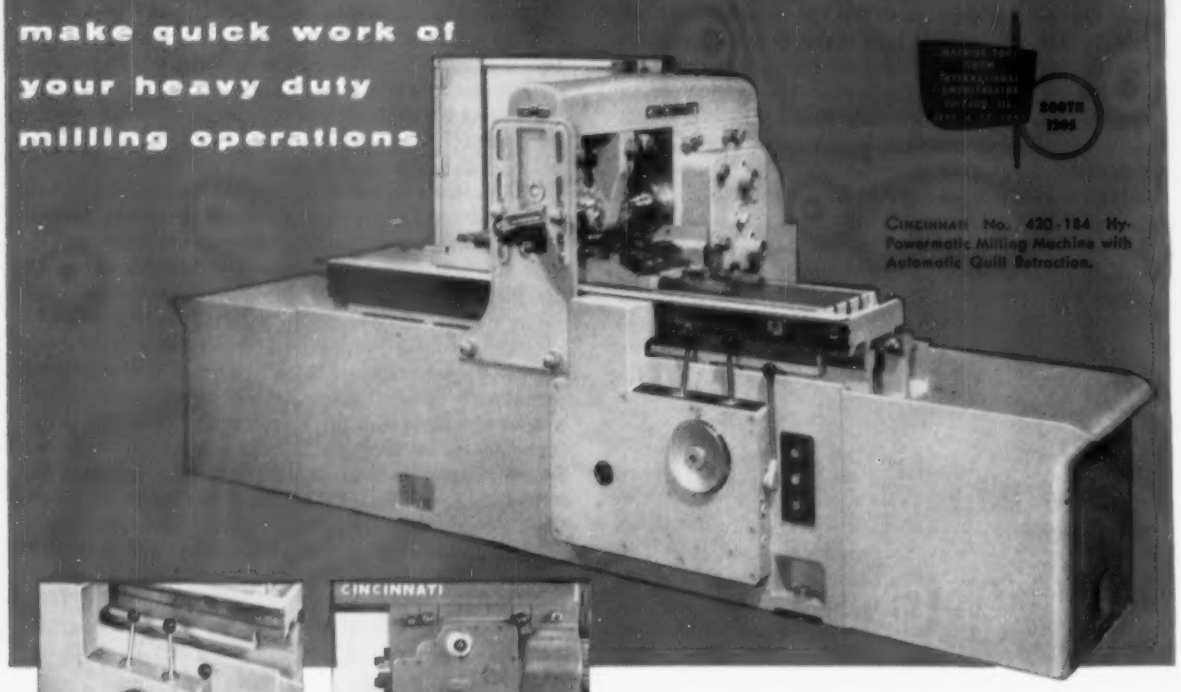

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RAILWAY LOCOMOTIVES AND CARS

Competition the Theme of Mechanical Division Meeting

Its implications as to regulation, quality and quantity of freight cars, and plans for future progress stressed in addresses at Montreal in June

"A wise and a distinguished educator, in an address which I had the privilege of hearing a short time ago, said that no law exists making human progress inevitable; progress is not something to be taken for granted; rather it is something that we must work at and plan for, with foresight and wisdom."

Thus spoke N. R. Crump, president of the Canadian Pacific, in the opening address, Tuesday, June 21, of the AAR Mechanical Division and Electrical Section. About 1,600 members and guests attended the three-day meeting at the Sheraton-Mt. Royal Hotel, Montreal.

Mr. Crump outlined the processes by which ideas are developed by the engineer and sold to someone who can raise the capital—someone who is comparable to railway management. In order to attract capital into private enterprise the prospects for profit in the enterprise must compare reasonably well with those of other industries.

"This urge to find more productive ways of using capital," said Mr. Crump, "is the dynamo that keeps our system going and growing. That's what makes America tick. The search for profit and the avoidance of loss are the compelling forces and the disciplines to which all management in private enterprise is subjected."

Much of the present regulation of Canadian and U. S. railways is based on the assumption that they still have a monopoly. "Basically the problem is one of harmonizing regulation and competition," he continued. "Some degree of regulation may still be needed to assure regularity and dependability of common carrier service. Regulation, however, should be designed to encourage the flow of capital into the different forms of transportation in such a way as to produce the most economic combination of transportation plant and facilities."

The railways, he said, are asking for equality of opportunity and equality of responsibility under regulated competition in the transportation industry.

"Everyone here serving on committee has his own responsibility with a railroad," said R. G. May, vice-president, operations and maintenance department, AAR, in his address at the opening session. "He not only finds the time to serve his own company but the industry as well. In most cases this participation in committee work requires being away from home and job. Yet the time and service are given willingly and without thought of personal gain. It is this spirit which provides the answer to how North Americans have developed a rail transportation system capable of moving more goods and more people at less cost than any other system anywhere."

There can be no let-up in efforts to develop increased efficiency, improved service and safety, he said, in order to meet the continuing demands, present and future.

"We cannot accept the progress already made as anything approaching a goal," Mr. May continued. It is inevitable, he believes, that studies will be accelerated to apply atomic energy in railroad locomotives.

"The close working arrangement with the Electrical Section has solved many of the problems arising in connection with additional improvements in the electrical and electronics field for the mechanical officer. . . . We can envision microwave for the remote control of switches, closed-circuit television enabling completely automatic recording of cars, radar control of car coupling speeds, instantly produced graphs showing load shifts in cars, and possibly an entirely new development in the field of refrigerants. . . ."

In his opening remarks, D. S. Neuhart, chairman of the AAR Mechanical Division and head of the UP's mechanical department, pointed out that the AAR becomes qualified to carry out its original objectives of promoting both the public interest and the general good of the railroads only to the extent that its constituents make it qualified. Too many members become so engrossed in their own responsibilities that they contribute all too little to the association.

The very nature of the railroad business demands collaboration. "It requires," continued Mr. Neuhart, "that we join ranks as one to improve our service and economic status as a whole. That is the function of the AAR. So, too, is ferreting out causes of poor performance; bringing about corrective measures without delay—and throwing off the cloak of tradition where it slows progress."

At the conclusion of the opening ceremonies the Mechanical Division proceeded to consider the matter of the 17 reports which made up its 1955 program. Abstracts of these reports and the high spots of the discussion after their presentation appear in this issue.

Later sessions were addressed by Owen Clarke, member of the Interstate Commerce Commission, and C. G. A. Rosen, consulting engineer, Caterpillar Tractor Company. Mr. Rosen's address appears separately in this issue.

NEW MEMBERS OF GENERAL COMMITTEE

At the annual meeting at Montreal the following members of the Mechanical Division General Committee were elected to serve until June 1957: B. M. Brown, general superintendent motive power, Southern Pacific; H. T. Cover, assistant vice-president and chief of motive power, Pennsylvania; J. L. Robson, chief mechanical officer, Great Northern; A. C. Melanson, chief of motive power and car equipment, Canadian National; J. W. Hawthorne, general superintendent motive power, Atlantic Coast Line; and J. A. Welsch, general superintendent motive power, Illinois Central.

Officers of the Mechanical Division continue to serve for another year.

A program for railroad men was set forth in a luncheon address by S. F. Dingle, operating vice-president of the Canadian National. To build for the future, he advised railroad men "to shrink where we should shrink . . . to grow where we should grow . . . to exploit our special advantages as our competitors do . . . to be free as prudent businessmen to change the pattern or character of service, or in extreme cases to substitute alternative transport services and close down rail operations . . . to take a more aggressive attitude toward competitors . . . and to perform the extra duty that each of us has as a citizen and a railroad man to educate the public in the railroads' case."

Mr. Dingle called attention to the fact that though Canada has more miles of railroad per capita than any country in the world, truckers get a quarter of the freight revenue for hauling 10% of the traffic.

He also emphasized that the CNR does not represent a socialist experiment. It was built primarily to develop the country. Its main difference from private roads is that the Canadian people as a whole are the stockholders. It, and the Canadian Pacific, are operated in a framework of competitive equality, with both equally subjected to regulations of a government board.

It is all right to unite and seek legislative relief to enable the railroads better to keep pace with the changes in transportation, but, there are other remedial steps which are far more important, said Interstate Commerce Commissioner Owen Clarke in his address.

First, and most important of all, he said, is the need to cultivate what he termed the "competitive instinct." Above everything the leaders of the industry must improve upon the *quality* of the transportation service they sell. Assembly-line methods and low inventories require that transportation be geared to constant and continuous production. Studies indicate that three-fourths of the shippers who abandon the railroads do so because of failure in this respect.

Time of delivery, both on the road and in terminals, must be speeded up, too, said Mr. Clarke. "Terminal delay is a wasting disease that gnaws at the vitality of most railroads. Cars are hurried over the road and then buried in yards for days on end." Keep cars out of yards as much as possible, he said, and also improve the yards.

The speaker showed that the railroads are now in a car shortage of serious proportions—79,680 fewer cars on May 15, 1955, than 18 months earlier—and on May 1, 1955, there were 113,543 bad-order freight cars.

The ICC is "deeply concerned" about the long-range effect of car shortages, Mr. Clarke declared. "There is no question that failure to furnish freight equipment when it is needed causes the diversion of traffic from the rails, a portion of which will never be recovered."

The time has come, he said, to give greater freedom to creative ideas in a stepped-up program of research. Such a program must be backed up with real courage to throw out the old in favor of the new.

"Railroad planning must be lengthened in range. While there is always need for the short-term view, it is no longer sufficient in itself. Short-term considerations of management must be part of a longer-range plan—a plan for a decade or for a generation. Certainly those in the railroad industry who planned for long-range growth ten years ago have since profited by that planning. . . .

"Our inescapable and underlying reason for optimism is our population increase. By 1975, "it is anticipated that we will have 55 million more people to feed and to house and to clothe. . . . So long as railroad leaders have faith in the future of America and are willing to plan accordingly, there can be no doubt that rail transportation will maintain its place of commanding importance in our national economy and our arsenal of defense."

Tank Car Rules Rewritten

The complete set of specifications for tank cars has been rewritten to incorporate all changes made since 1941. The revised edition will be in loose-leaf form to simplify keeping it current with each individual specification complete in itself.

During the rewriting inconsistencies were eliminated, nomenclature slightly revised, and appropriate paragraphs added or deleted with the intent of establishing uniformity between all specifications. Six specs were declared obsolete, four new ones adopted and six AAR appendices added, revised or in the process of revision.

Open-Top Loading Rules

The Supplement to Department of Defense Pamphlet MD-7, issued May 15, 1955, includes 12 new loading methods for boats, landing crafts, semitrailers, rocket launchers, tractors, truck bodies and material handling equipment cranes, fork lifts and tractors.

Requests have been brought to the attention of the committee which the shippers insist must be met if the rail carriers expect to retain the present volume of business. The principal proposals are:

1. The necessity of furnishing equipment in clean and good physical condition to enable the shipper to properly and safely secure his commodity for rail shipment.

2. The necessity of providing adequately equipped flat cars to permit shippers to secure loads with a minimum amount of securement and blocking.

3. The possibility of furnishing bulkhead type flat cars to prevent delays resulting from shifted loads and toward the more economical preparation of shipments.

4. The need of furnishing equipment which will provide a loading method more comparable to that followed on shipments using other forms of transportation.

5. The necessity of immediately and very materially reducing the damage occurring on shipments due to improper handling in transit.

The report presents detail changes in the open-top loading rules, based on inspections and experimental shipments, which have been approved in joint conference with the shippers and are

D. S. NEUHART
Chairman

C. E. POND
Vice-Chairman

W. M. KELLER
Executive Vice-Chairman
Director of Research

F. PERONTO
Secretary

expected to be issued soon in a Supplement to the MD publications.

As in the two loading-rule reports, the importance of meeting the desires of shippers as to types of equipment and methods of loading flat and open-top cars was the dominant note in the discussion.

According to one car department officer, loading rules are increasing in importance because the economic value to shipper and consignee of mechanical handling of lading on and off cars is increasing the amount of freight which is being loaded on open-top cars. Another aspect of railway traffic which will require adaptation of the loading rules is the growth of the piggyback movement. This has already begun to move in interchange. One officer foresees the need for rules for securing trailers on flat cars and for securing the contents in the trailers

New Wheels to Get Tests

The report of the Committee on Wheels gave details of manufacturing and service tests of the AAR X-2 and AAR X-3 cast steel wheels produced by the Southern Wheel Division and Griffin Wheel Company, respectively. They now have limited approval but additional installations will be authorized by the committee. Interchange Rules and Manuals have been changed to incorporate these wheels. An application has been received to authorize service tests of a centrifugal cast steel wheel produced by a division of the United Steel Companies of England. It was recommended that this wheel be approved for limited installation and shown in the Interchange Rules. It will be designated the AAR X-4.

Further work is to be done on the effectiveness of ultrasonic inspection of diesel locomotive wheels, and on the tolerances, marking and classes of wrought steel wheels. Work on the effect of shot blasting on diesel wheels has been stopped, but a study of the dimensions of these wheels continues. A new 40-in. diesel locomotive wheel and a 34-in. wheel for RDC cars were recommended for letter ballot adoption. A recommendation was made to the Arbitration Committee on the responsibility for overheated tubular axles. Revision of the Wheel and Axle Manual has been delayed and seven changes have been issued instead.

Safety Appliances

The ICC Bureau of Safety has given the AAR a proposal to revise the Safety Appliance Regulations in existence since 1911. The draft indicated that required changes would have serious effects on railroads and would be costly, according to the Safety Appliance Committee. Some AAR counterproposals have been prepared and a working committee is cooperating with ICC representatives to prepare a modified proposal. Approval of safety appliance details for tank cars with no precedent involved 206 committee actions during the year. Six designs of metal running board have been tested and approved for inclusion in the Interchange Rules, and a brake step design is pending.

Floor discussion brought out the point that present equipment conforming to present safety regulations will not have to be changed to meet the revised code. Members will be given an opportunity to comment on this before final adoption in the hope that the new provisions can be complied with on all new construction.

Lumber Loading Improves

Changes in pole and lumber loading methods, included in a supplement to Pamphlet MD-3 issued last year, mainly covered confining the overhangs to a single end of the pile, leaving one end square, and the location of piles not over 6 in. apart. These changes have materially decreased the number of loads requiring adjustment en route. Consignees and consignors are better satisfied because of the vastly improved transportation time of lumber shipments, both packaged and otherwise.

Experience with experimental loads using ¾-in. by .035-in. high-tension bands for top-unit ties on lumber shipments have led the committee to approve their use in place of the 1¼-in. by .035-in. bands now specified in the various drawings of loading methods.

Approval of the request of shippers that the loading of 8-ft lengths of packaged lumber be permitted (now restricted to a minimum of 10 ft) is expected to increase lumber shipments by rail.

A method of utilizing all side-by-side packages in a pile has been worked out to control the end shift of packaged lumber moving on conventional flat cars. It is meeting with success beyond all expectations. The method utilizes two additional interlacing ties per pile. These are passed through the top half of the bottom or intermediate tier and through the bottom half of the top tier. They tie all packages, both vertically and horizontally, into a single unit. A photograph of such a car on arrival at Chicago from South Fork, Colo., shows the lading in the same condition and same location on the car as when loaded.

The committee also describes a new method of loading lumber on flat cars with permanent end bulkheads. No full-length stakes are used, but 3-ft stub stakes are applied in all stake pockets as a safety measure. All packages in the lower tier are tied together, as are all in the top tier. All packages are then tied into a single unit with overall and interlacing ties. The packages are protected from the elements with sheets of polyethylene plastic applied on top of each bundle when it is packaged at the mill. Since September 1954 over 50 such shipments have been made from Goodwater, Ala., to points in Illinois and Michigan without a single car being shopped en route.

The committee makes a strong plea for the use of flat cars with permanent end bulkheads for the shipment of lumber. It recommends bulkheads extending 8 ft 6 in. above the floor, with

43 ft 3 in. clear length, wood floors 9 ft 4 in. wide, and stake pockets. Such a car, the committee says, will accommodate 95 per cent of the commodities moving on flat cars. The new method of loading, using the bulkhead cars, can reduce the cost of loading and unloading for the benefit of shippers and consignees as much as 75 per cent. To the railways it offers the opportunity to build up lumber traffic.

Prices Revised Upward

The Committee on Prices for Labor and Material carries on a continuous analysis of material, labor and new equipment costs. Changes shown in the committee's annual report are published in a supplement to the code of interchange rules effective August 1.

Labor charges and combined labor and material charges are increased by an award for paid holidays averaging two per cent of present basic rates of pay and by an award for health and welfare benefits averaging one per cent of present basic rates of pay.

Material and parts prices show small changes, most of them upward. Exceptions are couplers, most of which are a few cents cheaper, several sizes of journal boxes, brake beams and extra heavy pipe. Prices of passenger car axles are down.

Axle Research Continues

A final report on the fatigue tests of 5½ by 10-in. freight car axles is being prepared by the Committee on Axles. On the basis of the tests, the committee recommended, for letter ballot action, the adoption as an alternate standard to the AAR standard (black collar) axle, the "forged" freight car axle with raised wheel seats for plain or roller bearings.

Research is continuing on the effect of heating on fatigue resistance of plain bearing axles. Overheating in actual service does affect the fatigue strength of axles. The effect of copper penetration was not determined. The effect of a second overheating of axles in service was under investigation, but has been discontinued because of insufficient data and lack of specimens. It is planned to use the EMD test car to continue work on the development of fatigue cracks between axle seats in AAR roller-bearing passenger car axles. The Navy continued to use the fatigue test equipment at Canton whenever possible, but Timken has informed the committee that it needs the space occupied by this laboratory. It is to be moved to the research center at Chicago.

Couplers and Draft Gears

The Subcommittee on Couplers early in 1954 supervised tests of the controlled slack coupler to determine if its strength and operation would allow its adoption as an AAR alternate standard for the Types H and F couplers on passenger cars. The tests were financed by five coupler manufacturers and were conducted in the laboratories of two of these companies. Results have shown that the coupler has satisfactory strength, but that it undergoes greater shortening under compressive load than do Tightlock couplers. To change this, manufacturers have agreed to increase the section of the controlled slack coupler. The Committee recommended that this coupler be submitted for letter ballot as an AAR alternate standard on passenger cars.

Action was taken to prohibit interchange of passenger cars equipped with Pitt type couplers after January 1, 1956. To correct its weakness, McConway & Torley redesigned the head for casting in high-tensile steel and has called this the MT coupler. Stronger than the Pitt type, the MT can be a replacement for the Pitt coupler without any alterations to the car. Submitted to the Arbitration Committee was the recommendation that the MT coupler have approval only as a substitute for the Pitt type, but not as an alternate standard.

The Committee acted against permitting the bushing of out-of-round pin holes in coupler heads and knuckles. To insert a bushing would impair the strength of the pivot lugs and knuckle hub, and with a round-hole bushing, would load the pin with the entire buffing load. Permission for reclamation by welding the back end and keyway of yokes, now prohibited by Interchange Rule 23, was requested by a member road. Because the back end of the yoke is a critical region, the Committee felt that a porous weld, an uneven change in section, or poor normalizing could cause failure. Keyway build-up had been suggested if wear was not greater than ¾-in. This wear would mean that the boss and reinforcement would be worn away at the front of the slot. While proper welding and heat treatment could reclaim yokes, it was decided that the risk involved would not allow this rule change which would then apply to all shops.

Coupler Subcommittee Surveys

Reported were the results of a survey started when a member road reported unsatisfactory performance from the AAR alternate standard Type E swivel shank coupler. Roads with 168,165 equipped cars reported a very small percentage of failures and the majority did not recommend discontinuing manufacture, although there are indications that the coupler is not standing up as it should and this has been reported to manufacturers.

Magnaflux inspection of new couplers, an addition to the visual inspection of Specifications M-204 and M-206, was suggested by a member road. Submitted to 33 roads, response showed that 90.6 percent felt there was no need for this inspection, either mandatory or optional. The Committee had reported that a mandatory inspection with resulting repairs would add up to $2.75 to coupler cost, and that optional inspection would cost up to $6.00.

A hole cast in the knuckle tail to reduce weight has been the origin of cracks in high-tensile steel coupler knuckles. This hole was discontinued in 1950, and a member road asked what others are doing about taking these knuckles out of service. Two roads have arbitrarily removed them from cars, while others are allowing normal replacements to do the job. The Committee decided there was no justification for recommending that arbitrary removal be ordered by the AAR. These sections were submitted by the Subcommittee on Couplers headed by Committeeman Chairman, C. K. Steins, Mechanical Engineer of the Pennsylvania.

Draft Gear Certification

Following tests, the Committee acted to give conditional approval to Miner Class FR-16 and to Cardwell Westinghouse Type R-20 rubber draft gears with applications limited to 6,000 gears. Cardwell Westinghouse Type L-200-S-1, a short pocket gear, was tested, approved, and will be added to Interchange Rule 101. With the agreement of its manufacturer, Peerless DA draft gear has been removed from the AAR approved list and will be removed from the Interchange Rules. This gear had conditional approval, but none were ever sold. Applications have been received for specification tests on five short pocke rubber gears: Cardwell Westinghouse Types R-18, R-175 and R-185, and Miner Classes FR-69 and FR-100.

Draft Gear Subcommittee Recommendations

Increased draft gear capacity without developing excessive center sill reactions can best be obtained with longer travel gears. While producing a non-standard design, permission has been granted to a member road for the installation of 4½-in. travel gears in 36-in. pockets on 150 new refrigerator cars. Member roads are asked to channel manufacturers' requests for non-standard draft gear installations through the AAR. It is not the intention to stop development work, but to avoid interchange difficulties. When sufficient study and service information is available the Committee will make a recommendation on increased draft gear capacity.

Maximum draft gear reaction, the force delivered to center sills, is a direct function of the friction draft gear capacity just before it goes solid. This is usually about 500,000-lb, and rubber draft gears have been rated on the basis of a pre-determined travel that will give this same reaction. Rubber draft gears rated in excess of this capacity when certified by the AAR can deliver these greater forces to the car structure. The Committee states that large draft gear capacity alone will not protect a car or its lading from damage.

Giving heavy repairs to 150 old refrigerator cars, a car owner requested permission to replace Type G Farlow springs with the pads used in rubber cushioned draft gears. The Subcommittee ruled this was not a violation of Interchange Rule 2, but advised that conversion to complete approved gears be considered because of the eventual salvage value. Check tests were made on 28 gears of seven types with up to seventeen years' service. The appendix of the report contains the results of these tests at the laboratory now in Chicago.

Discussion

Comments on the report indicated general approval of the Committee's recommendations and actions. The coupler manufacturers, to whom the Type E coupler failures were referred, see little opportunity to increase its strength. A change of material would effect a limited improvement. More than this would require a complete redesign of a coupler which is gradually going out of use.

That the only way to reduce center-sill pressure with the draft gear is to increase the travel was emphasized several times. The Committee is asking two questions: 1. How much capacity can be obtained without changing the distance between the truck center and the coupler striking plate? 2. How much capacity must be provided?

A long-travel gear development was initiated on the Santa Fe for application on mechanical refrigerator cars to protect the refrigerating equipment from the effects of violent shocks. A draft gear manufacturer was asked to cooperate.

Interchange Rules

During the past year Arbitration Cases 1846 and 1847 were decided, and the following principal changes were recommended in the interchange rules:

Rule 1

Addition of a note to paragraph 4 so that a class A car will not receive a lower classification if it is temporarily in bad order condition because it requires minor body repairs. It will be considered as a bad order Class A car.

Rule 2

Modification of Par. (4) of Sec. (g) to provide for paid holidays expense and health and welfare benefits recently awarded to operating employees.

Rule 3

Addition of new Par. (a-1-c) to prevent the application of used air brake equipment having obsolete parts to new and rebuilt cars.

Addition of new Par. (f-2) to require a uniform width of deck on flat cars built new so as to provide for the adoption and use of shipments on flat cars of bundled, packaged and boxed material of uniform widths.

Modification of Par. (j-3) to provide for cars having extended repack periods. It now states that empty cars may be rejected when 3 months overdue for repacking, rather than when the repack date was more than 21 months old.

Addition of new Par. (t-1-d) specifying heavier swing hangers on Allied Full-Cushion trucks to eliminate failures which have been experienced with lighter designs.

Modification of parts of four rules (17, 88, 101 and 122) to provide for the use of the recently approved Cardwell Westinghouse type R-20 and Miner Type FR-16 rubber draft gear.

Rule 32

Addition of a new note following Par. (10-k) to establish responsibility for fire damage caused by defective floor type air circulating fans.

Modification of Item 1-(a) of Par. (12) (a) to eliminate border line cases and make the road loading the car responsible for contamination damage when loaded with any hides, pelts or skins. (These no longer need be green, green salted or salted as before.)

Addition of new Interpretation 10 to make the handling line responsible for damage to car caused by striking car float apron or parts thereof unless the car violates the AAR clearance diagram.

Rule 60

As recommended by the committee on Brakes and Brake Equipment, addition of new Note 7 to require that renewal of bushings in triple valve, control valve or AB valve operating portions be done by the air brake manufacturers.

Rule 66

Modification of Par. (b) to permit the use of wooden dust guard plugs when properly secured so they won't get lost.

Modification of Par. (g-2) to make more lenient the requirement for repacking 12-17-month boxes and to eliminate the penalty. This penalty is no longer felt to be justified under present operating conditions. It was also felt that complete repacking attention at reduced periods is needed only where packing is removed from all journal boxes in both trucks to make other repairs.

Addition of new Par. (h-2) to provide requirements and charges for cars having repack stenciling which indicates a repack period longer than the standard 18 months.

Addition of new fourth note to Interpretation 4 to eliminate from service older types of packing retainers (those without a downward offset in each horizontal leg to clear the axle collar which have been causing damage to journals and resultant hot boxes. (This subject was also covered in Rule 101 in which a table listing approved retainers was modified.)

Rules 70 and 98

Addition of new Par. (h) to Rule 70 and new note following Par. (c-7) of Rule 98 to provide an outlet for AAR X-2 and AAR X-3 experimental cast-steel wheels removed in good condition and credited to car owner, on the same basis as one-wear wheels, per Par. 7 of Rule (98-c). Also the addition of new Par. (c-9) to Rule 98 to provide disposition or credits for new design AAR X-4 experimental cast-steel wheels.

Rule 86

Addition of new Par. (c-1) to provide for scrapping tubular axles at the expense of the car owner if the required wheel shop examination shows the Brinell to be below minimum requirements (227).

Rule 101

A new design of brake beam safety support was recommended for inclusion in the Table.

Passenger Car Rules

The addition of a new note following paragraph (j) to show that cars on which the improved and strengthened "MT" type high tensile steel coupler has been substituted for Pitt type couplers are acceptable in interchange.

Addition of new note following Par. (j) of Rule 2 to provide for the use of the improved and strengthened "MT" type coupler in passenger cars in place of Pitt type couplers.

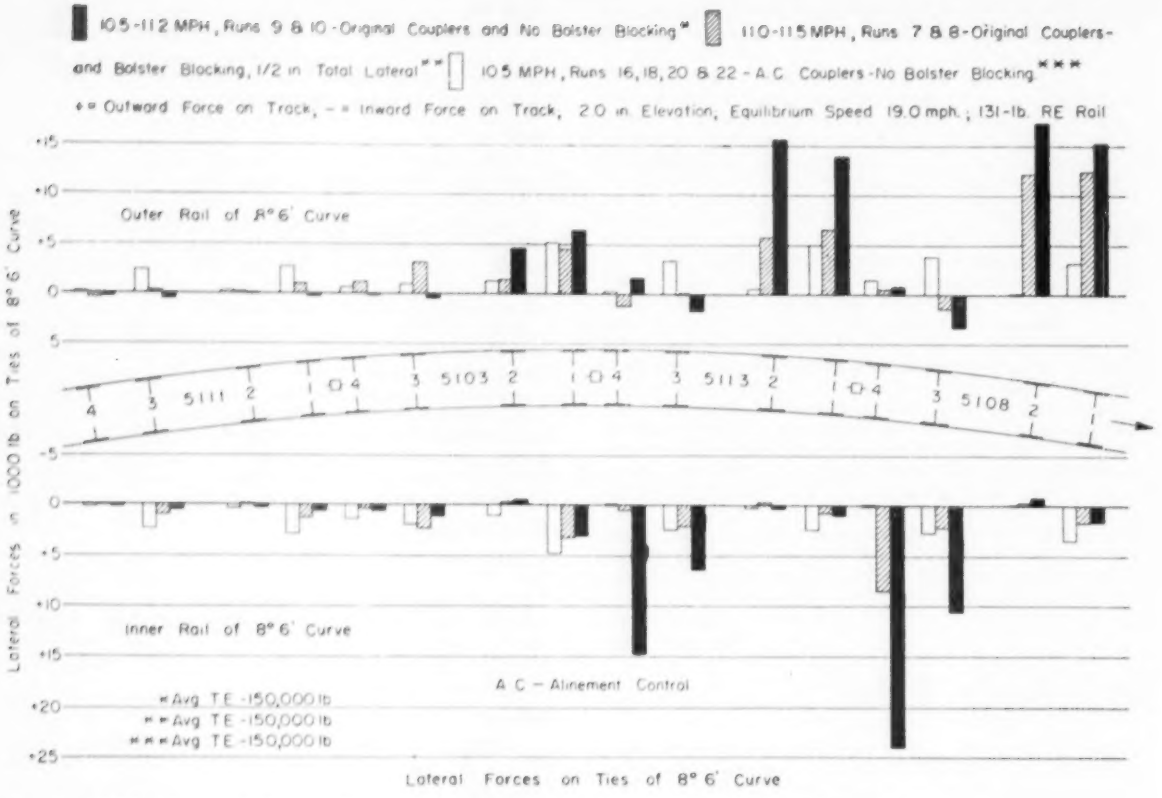
Modification of Par. (g) of Rule 8 to make the handling line responsible for missing metallic steam heat connectors as well as other parts of the steam and air lines to provide protection to the owners of the many cars that have 18 inch of pipe between the end valve and the steam connector.

Performance of Locomotives

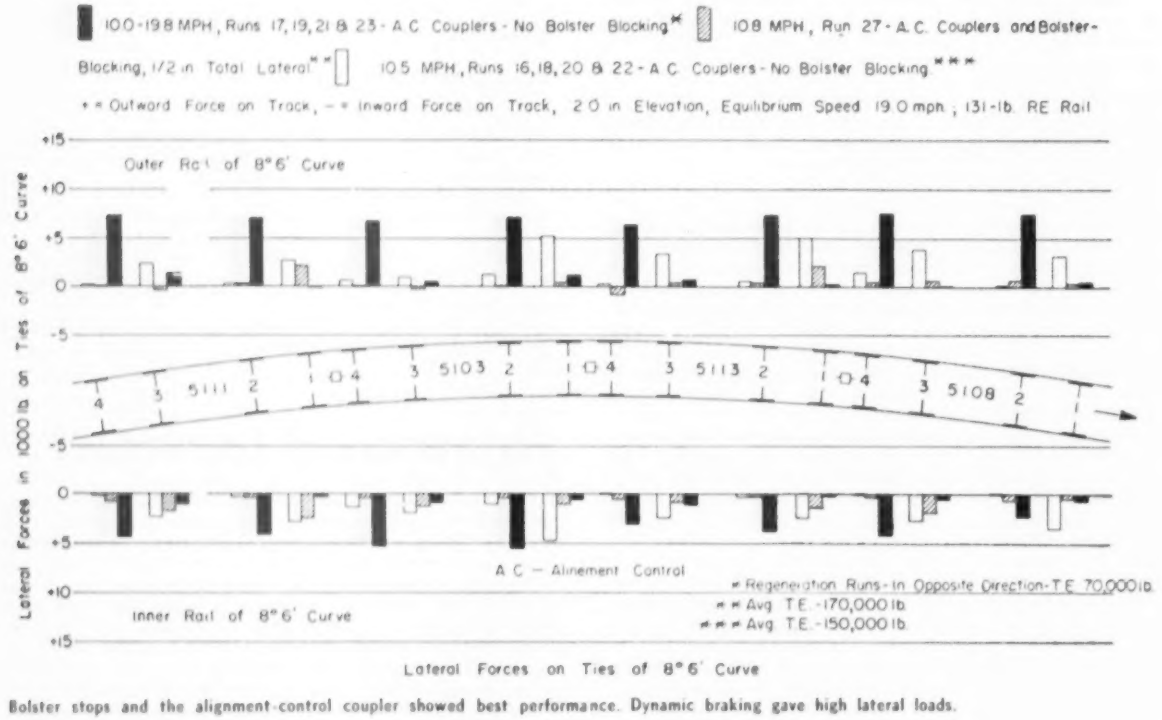
This year's report on locomotives, outside of a progress report on both steam- and gas-turbine developments, dealt largely with brake equipment for diesels, flange lubrication, and jack-knifing of diesels in multiple-unit operation.

The report showed that the Union Pacific now has 25 gas turbine-electric locomotives operating in pool service west from Green River, Wyo., to Ogden, Utah (175 miles), and east from Green River to Cheyenne (307 miles). During 1954 these locomotives hauled 6,204,959 thousand gross ton-miles with train-miles totaling 1,817,059. One unit has accumulated 306,472 miles. The first 10 units in service, in 1952 and 1953, accumulated 2,187,976 locomotive-miles. The availability of all is about 80%.

The N&W No. 2300 steam turbine-electric has undergone tests since July 1954 that have demonstrated its ability to handle tonnages equal to or greater than the N&W Y6b or Class A Mallets with fuel savings up to 30%. No difficulties attributable to the


105-112 MPH, Runs 9 & 10-Original Couplers and No Bolster Blocking*
110-115 MPH, Runs 7 & 8-Original Couplers-and Bolster Blocking, 1/2 in. Total Lateral**
105 MPH, Runs 16, 18, 20 & 22-A.C. Couplers-No Bolster Blocking***
+ = Outward Force on Track, − = Inward Force on Track, 2.0 in. Elevation, Equilibrium Speed 19.0 mph., 131-lb. RE Rail
Outer Rail of 8°6' Curve
Inner Rail of 8°6' Curve
Lateral Forces in 1000 lb. on Ties of 8°6' Curve
A.C. — Alinement Control
* Avg. T.E. -150,000 lb.
** Avg. T.E. -150,000 lb.
*** Avg. T.E. -150,000 lb.
Lateral Forces on Ties of 8°6' Curve

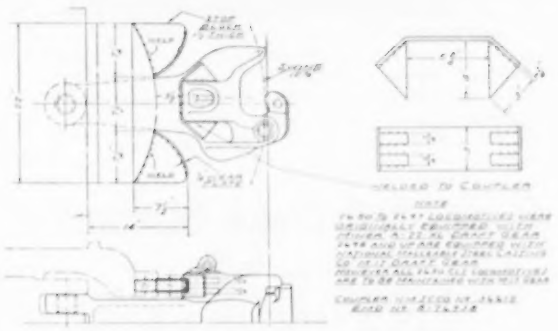
The use of bolster stops or of the new alignment-control coupler showed a reduction in maximum lateral forces.


100-198 MPH, Runs 17, 19, 21 & 23-A.C. Couplers-No Bolster Blocking*
108 MPH, Run 27-A.C. Couplers and Bolster-Blocking, 1/2 in. Total Lateral**
105 MPH, Runs 16, 18, 20 & 22-A.C. Couplers-No Bolster Blocking***
+ = Outward Force on Track, − = Inward Force on Track, 2.0 in. Elevation, Equilibrium Speed 19.0 mph., 131-lb. RE Rail
Outer Rail of 8°6' Curve
Inner Rail of 8°6' Curve
Lateral Forces in 1000 lb. on Ties of 8°6' Curve
A.C. — Alinement Control
* Regeneration Runs-In Opposite Direction-T.E. 70,000 lb.
** Avg. T.E. -170,000 lb.
*** Avg. T.E. -150,000 lb.
Lateral Forces on Ties of 8°6' Curve

Bolster stops and the alignment-control coupler showed best performance. Dynamic braking gave high lateral loads.

basic design of the locomotive have been experienced to date. Electrical maintenance is comparable to the diesel-electric. To March 1, 1955, the No. 2300 had accumulated 28,000 miles of service.

The coal-fired gas-turbine unit of the Locomotive Development Committee, up to March 30 this year, had accumulated 388 hours of operation, not counting the 1954 tests. The average load during these tests was 3,300 hp with a coal rate of 0.96 lb/hp-hr.



Railroad designed, this device only limits coupler swing during pushing operations and leaves it unlimited at other times.

Continuous runs of 53 hr have been made without trouble with the ash separation system.

The general opinion of the committee, with respect to flange lubricators and track oilers, was that longer wheel and track life may be expected with the use of lubricators but that each railroad must determine for itself how important flange wear really is and then decide on an economic basis what measures are justified. One advantage, however, in m-u operation of diesels is the indirect effect of reducing flange wear due to jack-knifing.

Jack-knifing—Tests and Solutions

The jack-knifing of two or more diesel units coupled in multiple has had serious results. It has been found increasingly serious as more units are coupled together. The most extreme results have been experienced in heavy pushing operations when four coupled units have developed such great lateral forces that one of the units or the caboose, or both, have been derailed, or rails have been overturned. Lateral forces also have resulted in excessive flange wear and in the overheating of the thrust bearings at the end of the axle. During one test, the temperature of the thrust block on one axle had a temperature of 450 deg F at which time the throttle was reduced to prevent failure of the bearing. Heavy dynamic braking has shown the same effects, but lateral forces are not as great.

In cooperation with the AAR's Engineering Division, four GP-7 locomotives were tested in pusher service. The test track section was an 8-deg 6-min curve located on a 1.72 per cent ascending grade. Within a mile of the curve, the grade increased to 2.2 and 2.4 per cent so that the train was on the heavier grade when the pusher was on the test track. Lateral pressure on the track, lateral movement of the head of the rail, and stresses in the web were recorded by instruments on the ground. Speed and drawbar records were obtained with a dynamometer car. Lateral load on the axles, thrust bearing temperatures, draft gear motion, and bolster lateral swing were measured on the second pusher unit from the train. A number of combinations of standard couplers, special alignment-control couplers, and bolster stops were tested in both pushing and dynamic braking operations. It was shown that the alignment-control coupler and bolster blocking gave the lowest lateral forces. In dynamic braking the outward force on the outer rail was very uniform throughout the four units and with 70,000-lb retarding force, the rail pressures were greater than those with 150,000-lb pushing force. Maximum lateral force was exerted at the trailing wheels of each truck and there was a corresponding outward force on the inner rail of the curve at the opposite wheel. Jack-knifing between the first and second units followed the pattern of rail pressures and measured 11 to 12-in. with no blocking, 3 to 4-in. with ½-in. total lateral, and 0 to 3-in. with alignment control couplers and no blocking.

The alignment-control coupler and draft gear requires a special draft gear pocket, but an arrangement fitting the standard pocket is under development by one manufacturer. The builder of the locomotives used in this test has a standard application of bolster stops and is supplying them as basic equipment on all general-purpose locomotives geared for 70 mph or less. Railroads have been developing solutions of their own, and one line has designed a rubber cushioned bolster stop. It was felt that this device might impair the riding qualities of the locomotive at higher speeds, but in a single-unit passenger operation the stops were reported to have a steadying effect. Limiting coupler swing was the approach used by another railroad. This device does not limit the swing until the draft gear is compressed by heavy pushing operations. Under no load, or when pulling, the swing is not restricted. Even the application of the Type F tightlock coupler has been effective in preventing jack-knifing.

New Refrigerator Car Specifications

New specifications for standard refrigerator cars suitable for fruits and vegetables are submitted by the Committee on Car Construction and recommended for letter-ballot action. The principal changes are the addition of provisions for welded construction; increase of permissible height, floor to ceiling; insulation increased from 3 and 3½ in. thick to 4 and 4½ in. thick; and thermal conductivity in Btu per inch of thickness per sq ft per degree difference of temperature reduced. The specifications call for floor racks capable of supporting heavy lift trucks, provisions for stage icing (formerly optional), drain tubes extending below the journal-box opening, and sliding as well as hinged side doors.

Side Frames and Bolsters

In answer to a request sent all member roads, 242 broken side frames were reported by 50 member roads for the year ended March 1, 1955. Only seven of these were failures of AAR approved designs. Two pattern sizes of a single design accounted for 16 failures; another, for 15. The subcommittee proposes to eliminate 10 of the non-approved patterns, for each of which four or more failures were reported, by prohibiting them in interchange, effective January 1, 1957. It proposes further that new cars built on or after January 1, 1956, must be equipped with approved side frames, and that after January 1, 1960, all freight cars must be so equipped to be acceptable in interchange.

These proposals are presented for the consideration of the Car Construction Committee as a whole and the Arbitration Committee.

Inadequate Box-Car Design

The alternate standard light-weight welded box car, the drawings for which are in the Supplement to the Manual, has been rendered inadequate by faster speeds, longer trains and step-ups in switching operations. The committee recommends that the drawings of this design be made obsolete and removed from the Supplement.

The committee proposes that the box-car drawings in the Supplement to the Manual be changed to show floor boards 2⅜ in. thick, supported by three 6.7-lb Z-bar longitudinals on each side of the center sill. The present 1⅝-in. boards, supported by two longitudinals on each side of the center sill, are no longer considered strong enough.

"Full-Cushion" Trucks a Problem

In its 1953 report the Car Construction Committe recommended that cars equipped with Allied Full Cushion trucks be prohibited in interchange. This was later withdrawn and certain maintenance measures recommended to avoid some of the accidents then occurring. The committee now recommends that the trucks be overhauled at two-year intervals and specifies the procedures which should be followed. All derailments should be reported and owners should consider a replacement program. The Arbitration Committee has included in this year's report an added paragraph in Rule 3 requiring that, effective January 1, 1956, these trucks which move in interchange must have the improved swing hangers and swing-hanger shoes shown by the committee in this report.

A subcommittee has prepared revised specifications for repairs to certified brake beams to include the Number 24 beam and new types, and to clarify the matter of repairs to beams when the fundamental relation between the tension and compression members is not disturbed. Wear or corrosion limits of tension members of different designs are also set forth.

Provisions for heavier brake levers and larger brake-levers pins

are also proposed for use with brake beams of 24,000-, 28,000- and 36,000-lb capacity, in order that AAR recommended fiber stress limits be not exceeded.

Other Items

A subcommittee proposes that the height of the rim of the truck center plate be reduced from 1¼ in. to 1⅛ in. to relieve the heavy contact between the rim of truck plate and the body center plate. The interference occurs after 15 or more years of wear. The report describes a simple mounting for an air-motor grinder by which the rim of existing truck center plates can be ground down to the 1⅛-in. height.

It is recommended that changes be made in the Manual and interchange rules to permit the splicing of centersills on cast steel underframes without the use of splice plates. This is proposed as a letter-ballot item.

When cars are moved after journal-box lids are opened for inspection the lids on gondola and flat cars tend to catch above the inward flange at the bottom of the side sill.

The report illustrates a horizonal shield plate welded to the bottom of the sill, under which the journal box lid remains as the truck turns on a curve.

Confusion arises in utilizing cars originally built for freight-train service but later converted for passenger-train service without changing the numbers to a passenger-car series.

The Operating-Transportation Division proposed the following rules for such conversions: 1. The changes must be approved by and the cars be acceptable to the AAR Mechanical Division as passenger equipment. 2. The cars must be numbered in a passenger car series distinguishable from a freight car series. 3. The cars must be registered as passanger equipment in the Official Register of Passenger Train Equipment.

The committee proposes the necessary changes in the Manual to carry out the Operating-Transportation Division's requirements, and submits them for letter-ballot action.

Discussion

Comment on the report suggested that the committee was rather liberal in permitting the use of altered designs of truck side frames to accommodate the various integral details such as brake hangers, spring planks, and others. These increase the difficulty of supplying replacements when necessary.

Referring to the recommendation with respect to box car floors consideration was asked for the application of perforated plates on the floor area between the doors. It was suggested that the replacement of swing hangers on the Allied full cushion truck, as recommended by the committee, was far from an adequate rehabilitation of these trucks.

Specifications for Materials

Material specifications prepared by ASTM, SAE and other industry-wide agencies will be used as AAR standards wherever practical in the future. They will be reprinted with an AAR specification number but will also include the number of the other organization which originated them. Materials conforming to industry-wide standards are frequently available at lower costs than AAR standard material. When applicable for railroad service, the committee will approve the use of the other standards, and will continue to write specifications only for those items peculiar to the railway industry.

Work is going on with oil companies and engine builders to develop test techniques for measuring the performance of railroad diesel lubricating oil. The committee approved a joint committee action which prepared a specification for fire resistant refrigerator car insulation.

Recommended was letter ballot action on the following specifications with the changes indicated: M-101, Carbon steel axles—Dimensional tolerances; M-103, One-wear wrought steel wheels—Permissible quality variation; M-116, Structural steel—Mechanical properties and marking; M-122, Carbon steel bars—Agreement with commercial practice; M-611, Coolant system hose—Elimination of entire specification; EM-904, Renovated journal box oil, and EM-906, New journal box oil—Elimination of both specifications and substitution with single specification M-906-55, Journal box oil, with changes in viscosity requirements. Submitted as information were changes in the following specifications: M-105, Carbon steel for forging—Editorial change; M-501, Lined journal bearings—Inspection practices; M-601, Air brake and signal hose—Change in marking; and M-910, Renovated journal box packing—Editorial change.

Brakes and Brake Equipment

Stuck brakes under investigation by the committee since 1950, continue to interfere with train movements. The conditions contributing most to this are the leakage of AB portions gaskets, brake pipe leakage in excess of AAR limits, and general freight car maintenance. Leakage of AB portion covers has been greatly reduced by portion-back-cover reconditioning and satisfactory gaskets. Over 60 percent of all leakage is through defective angle cocks, pipe couplings and nipples, and air hose couplings and gaskets. A recommendation was made to the Arbitration Committee that there be arbitrary in-date testing of air brakes on all cars on repair tracks and that this be a mandatory requirement of the Interchange Rules.

Specifications for clamps used on brake pipe, signal and straight air hoses on cars and locomotives were prepared and recommended for letter ballot. A second letter ballot item is the recommendation that Manual pages B-71-1955 and B-72-1952 be revised to show inspection gauges that will measure hose couplings and not pass those that contribute to leakage. Another ballot item is a change of outside diameter on the shank of the hose end of nipples and air hose couplings to maintain a proper dimensional relation between the shank and bead at the point where the hose clamp is applied. A faster and more complete single car test for freight cars on repair tracks is the aim of the recommendation for a letter ballot on replacing Manual page B-17-1955 with a new diagram showing a test device incorporating the flowrator, dummy test coupling and larger air gauge the committee considers as improvements. Testing procedures using this device are now under study. During the year the QRR brake cylinder release valve specification was adopted by letter ballot and is incorporated in the manual.

Brake and Brake Equipment Recommendations

It was recommended to the Arbitration Committee that used AB brake equipment applied to new or rebuilt cars after January 1, 1956, be required to incorporate the following components—filter protective charging chokes, self-oiler main pistons and cylinders with non-pressure heads and integral return spring guides. They also received a recommendation that AB control valve bushing renewals should be done only by air brake manufacturers to use only the current standard design. The Committee for Specification of Materials was advised that Specification M-401 should be revised to set a limit on pattern letter thickness on the guide lugs of brake shoes. The Committee on Locomotives was advised that diesel units should use standard angle cocks on both ends, or at least cocks that operate in the standard manner. As information, a specification has been prepared for devices intended to supplement electro-pneumatic brakes not otherwise protected in the event of circuit failure. It requires that the device produce an automatic brake application by the pneumatic system in the event of complete or partial electro-pneumatic failure.

The Committee has no objection to changes in the air brake rules complying with the ICC revision of Rule 208 (a) changing the cleaning time of locomotive control valves from six months to one year. The Committee on Geared Hand Brakes was given a suggestion that when dual AB-1-B brake equipment is replaced by a single equipment, the hand brake should have multiplying device or unlimited take-up.

Brake and Brake Equipment Approvals

The brake cylinder release valve developed by Cretar Adams & Co. meets specification requirements. General Committee approval was recommended for a limited application of Caco valves for service approval. Permission was granted for a number of brake piping installations on cars with Pullman Standard cushion underframes, but a change is necessary to reduce the length of

the branch pipe on future cars. Satisfactory tests have led to the recommendation that Dresser couplings be added to the table of fittings in Interchange Rule 101. The Garlock AB brake cylinder packing cup was favorably reported after a series of tests. There is no approval test in the packing cup specification and no further action could be taken. An improved combined dirt collector and cut-out cock was approved as an alternate standard and will be added to the Interchange Rules. It has better flow characteristics and an O-ring seal on the key.

A member road was advised that the limit on Inside brake cylinder diameter in the Manual is for both manufactured and and reclaimed cylinders, and should not be exceeded. Another road was told that the Committee felt there should be no rule change requiring a test-track test of AB valves in event of brake burns because an on-the-spot check with the single car test device should be better able to find the cause. RDC cars are entitled to extension of cleaning period for D-22 equipment because of the applicable ICC rules another member was advised.

Brake and Brake Equipment Investigations

Study and investigation of the Wabcoseal angle cock are continuing to determine performance. Preliminary investigation has been made of the AC brake equipment and work is going on with manufacturers to determine whether desirable features of this equipment could be made part of the AB portions. The location of the angle cock on equipment with Type F Tightlock couplers is still under investigation at the request of the ICC and with the aim of revising the Manual. Nine other items dealing with brakes and brake equipment are reported to be under investigation.

Discussion

The discussion strongly supported the proposal to increase from 6 to 12 months the maintenance interval on certain air brake items covered in Rule 208(a). One member said the equipment does not belong on a modern diesel if it won't go 12 months—that, after all, if the D22 equipment can go two years there is no reason that D24 can't go half that long.

Another question concerned the recommendation for the type cutout cock that should be used. The PRR has equipped all its locomotives with either brake-pipe end cocks or standard angle cocks to avoid errors from different handle positions and recommends this practice in the interest of safety and standardization. Part of the committee also felt this way, but the majority favored the proposal as written.

Ways to reduce hose coupling leakage were discussed, as this leakage comprises a majority of brake pipe leakage which is about two-thirds of the total leakage on a car. A cold weather test and closer control of the conditions of the coupling and the method of application of the gasket were felt to be helpful.

To Standardize Hand Brake Wheels

The engineering committee of the geared hand brake manufacturers has agreed to design a standard brake wheel to fit all makes of vertical wheel hand brakes made after a later date. The use of this wheel would reduce large inventories of many designs of wheels, permit use of same wheel on all new designed brakes and do away with many conflicting directions that appear on some wheels when used on brake units other than those for which they were manufactured. These wheels will be made of either malleable iron, cast steel or of pressed steel having a forged steel hub riveted thereto.

The 34 types of geared hand brakes to which AAR Certificates of Approval have been issued have been divided into two classes, active (29 brakes) and discontinued (5 brakes).

Two proposals were recommended for letter ballot action. The first would establish a standard length of brake chain (21 9/16 in. from line of lower attachment rivet hole in housing to center line of clevis rivet or bolt). The second would change the pull requirements of paragraph 5 (e) for reclaimed hand brakes from "2,000 to 3,000 lb" to "at least 3,925 lb," making this requirement the same as for new designs.

A cylindrical screw brake simulating that of an internal expansion type within a wheel drum was rejected as being too revolutionary and in need of too much development work to apply it to existing equipment.

Discussion

A question was raised concerning a revision calling for a 21 9/16-in. chain length because no tolerance limits were indicated, but no change was made in the language as it was considered primarily a locating dimension.

Lubrication of Cars and Locomotives

Under study are the increased use of grease for roller bearing lubrication and changes in seal types that have intensified the problem of leakage through the rear grease seal. Relubrication on a three year basis has been approved for the grease-lubricated cars of a member road after test, and other requests have been made. The committee added one new grease to the approved list, reported successful road tests of four others, and is preparing to test five more.

The three journal box lids submitted for approval during the year failed to meet specifications. The redesign of a fourth was tested and improved performance is reported. Members continued to make reports of journals damaged by spring type packing retainers. A recommendation was made to the Arbitration Committee that approval be withdrawn from six such devices, and that their mandatory removal be ordered. There have been no reports of damage by the modified spring type retainer. One "long" type spring packing retainer was approved, and a second retaining device was approved for limited interchange service.

Lubrication research has been facilitated by three new test machines installed at the mechanical laboratory during the year. The committee received an Armour report on the hot box problem, and laboratory reports on eight journal lubricators, on new waste saturation, and on a waste grab prevention device. The Armour report and another covering road tests of journal lubricators were submitted to members. Changes in the specifications for new and renovated journal box oils have been recommended. The viscosity of the oil would be changed from 80 to 100 to provide a lighter oil at low temperatures and a heavier oil at high temperatures.

The RS journal stop and packing retainer on a number of roads has been reported to be doing a good job. Satisfactory service on a Frisco car is reported in detail. Tests of the National Dust Deflector Housing indicate that the device has undesirable characteristics. Changes in the Lubrication Manual are planned to show how to handle the many recently developed journal lubricators, ventilated journal bearings, the flat bearing and wedge, and the RS journal stop. A preliminary draft of the manual section covering 14 journal lubricators is included in the report and summarized in this issue, page 56.

Discussion

The discussion also included a list of required characteristics for pad-type lubricators as seen by Miller. It was also pointed out that there are now about the same number of cars in service with lubricators as with roller bearings so that the economics of the two types of equipment can be evaluated.

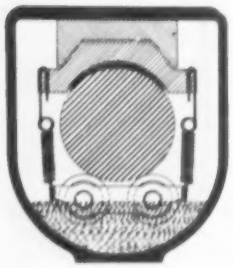
It was pointed out that the railroad industry is now paying $20 million a year to repack its two million freight cars, yet is being hampered by 128,000 set-out cars per year because of hot boxes—also that most operating men consider such deficiencies of loose waste as waste grabs and misplaced packing to be the cause of two-thirds of the hot boxes. If this contention be true, about 85,000 set-outs annually could be eliminated.

The saving from eliminating this many set-out cars plus the value of improved operation could go a long way toward paying for journal box improvements as they were being made and lead to substantial savings upon completion of such a program.

Lifting the lid on . . .

Journal Lubricating Devices

Behind yellow-painted journal box lids carmen are finding a growing number of special lubricating devices. AAR is putting instructions on 14 of them in the Lubrication Manual. They have approval for limited application after AAR tests. When they are installed, the type is stencilled on the side of the car. Only the Plypak uses conventional waste packing. All of them use AAR car oil for lubricant. Inspection is made for overheating and to see if the device has shifted out of position, but no "setting-up" with a packing iron is to be done. In event of failure, AAR says to hold device for instructions and apply conventional packing if no duplicate is available.



EMPIRE JOURNAL LUBRICATOR

Empire Journal Lubricator Co.
343 S. Dearborn street
Chicago 4

Two ball-bearing rollers held in contact with the bottom of the journal by four springs hooked through drilled holes in the journal bearing lugs feed oil with rotation of the journal. A special oil-seal dust guard is used. Oil level should be ½-in. below journal collar.

JEFFERS JOURNAL LUBRICATOR

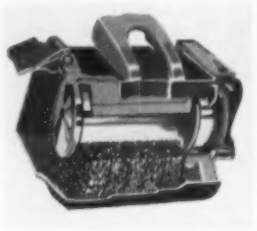
Fullo Corporation
2610 Eastwood avenue
Chicago 25

A silicon-impregnated wool-felt wick covers a tempered spring-steel frame to feed oil to the journal surface. Fillet oil seal and lid seal are built into the device and it is bolted to the box just under the lid opening. Oil level should be kept about 1-in. above box bottom.

HENNESSY JOURNAL LUBRICATOR

Hennessy Lubricator Co.
605 Guilford avenue
Chambersburg, Pa.

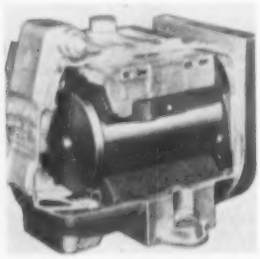
The pad-type oil distributor is fed by a pump actuated by the axle end movement while the car is running. Also used are a special oil-sealing dust guard and an inner lid seal. Gage mark on the lubricator frame shows the proper oil level—about 1-in. below the collar.



CHENILLE ROLL PACKING

Journal Box Servicing Corp.
1112 East Kessler Blvd.
Indianapolis 20

These are manufactured chenille packing rolls shaped and applied like waste rolls for journal box packing. Four rolls are used in 5 x 9-in. boxes, and five in the larger boxes. Lubrication is through wicking action. Oil level should be about 1-in. above the bottom.



STAPAX LUBRICATOR

Lubrication Products Co.
5606 Herman avenue
Cleveland 2

A cylindrical shaped felt pad is formed around steel springs and has music wire or chain spiders built into it to prevent rolling. Lubrication is through wicking action. Oil level is to be kept about level with the top surface of the lower layer of the pad in the box.

MILLER JOURNAL LUBRICATOR

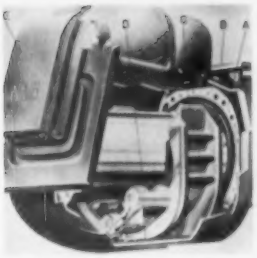
Miller Lubricator Co.
Winona, Minn.

A rectangular shaped cellular rubber core is enclosed in tough blanket-like material made of threads and wicking cloth. Contacting journal and box bottom, this blanket wicks oil to the journal surface. Oil level is to be kept about 1-in. below the journal collar.

CEL-O-PAK JOURNAL LUBRICATOR

O-Cel-O Division
General Mills, Inc.
1200 Niagara street
Buffalo 13.

These are semi-circular cellulose sponges shaped to fit the journal and box. Oil is fed to the journal surface through the sponge by wicking action. Two sponges are used for packing each box. Oil level is to be maintained about 1-in. above the bottom of the box.



NMB SEALED JOURNAL BOX KIT

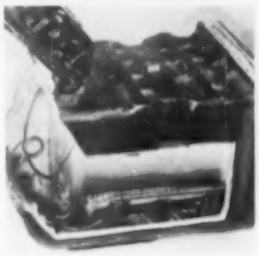
Railway Equipment Division
National Motor Bearing Co.
Redwood City, Cal.

This assembly has a lubricant conveyor feeding oil from the bottom of the box to the journal as it rotates. A special sealing dust guard, special journal box lid, and guard bearings that limit axle end movement are included. Oil level should be ½-in. below the journal collar.

OPTIMUM JOURNAL LUBRICATOR

Railway Service & Supply Corp.
510 So. Harding Street
Indianapolis.

Lubricator has two steel retainers into which are fitted two lubricating rolls of special blanket material rolled and tied to shape and giving wicking action. Box lid has heat indicator that paints axle end yellow if overheated. Keep oil level about 1-in. above bottom of box.



ROLIN RAILROAD JOURNAL LUBRICATOR

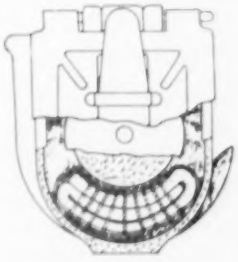
Runknagel and Nichols, Inc.
Room 2025, 165 Broadway
New York 6.

This lubricator consists of a lubricating pad held by a flexible cradle frame that has two spring clips holding the assembly in proper position. Lubrication comes from wicking action. Oil level should be at the red mark on the cradle frame—about ¾-in. above bottom.

SOCKELL SNUG-FIT JOURNAL LUBRICATOR

Seaboard Lubricator & Mfg. Co.
P. O. Box 10185
Raleigh, N. C.

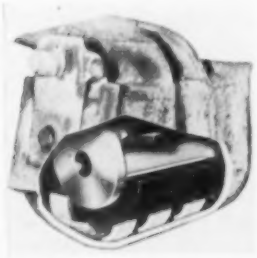
A spring-loaded yarn pad is held against the journal surface with six helical springs. Wicks extend from the pad to the bottom of the box and provide lubrication through wicking action. Oil level should be kept about 1½-in. from the bottom of the box.



UNI-PAK JOURNAL LUBRICATOR

Uni-Pak Corporation
P. O. Box 8302
Pittsburgh 18.

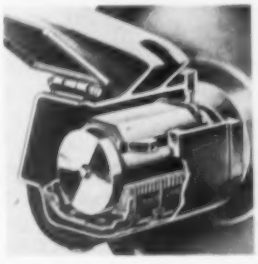
A foam-Neoprene body is sewed into a cotton container with special weave yarn looped through entire assembly to wick oil from the bottom of the box to the journal surface along its entire length. Oil level is to be maintained at about 1-in. above the bottom of the box.



EVER-PAC JOURNAL LUBRICATOR

United States Rubber Co.
4300 New Haven avenue
Ft. Wayne 4, Ind.

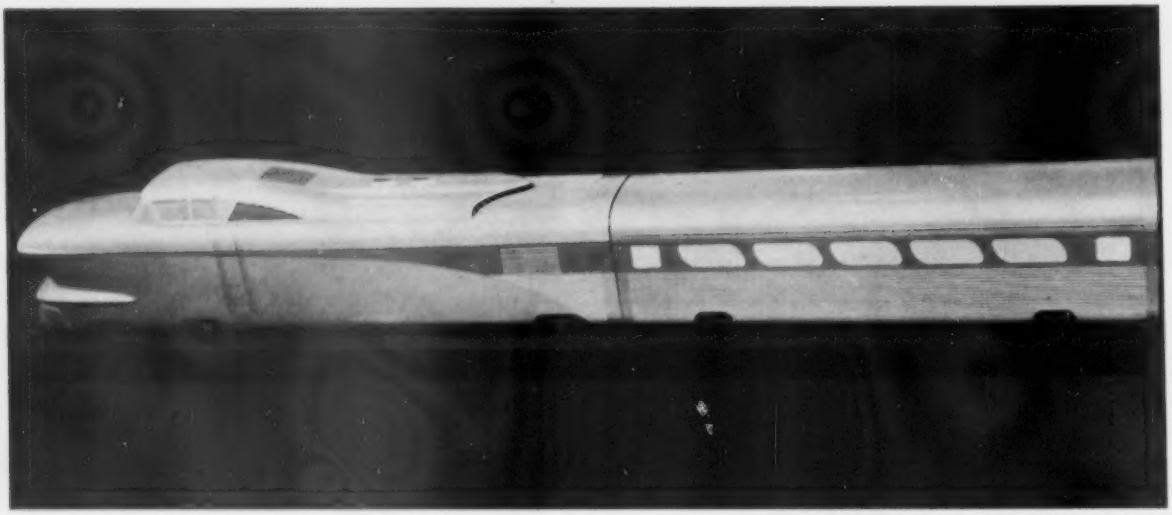
This lubricator has a body of synthetic sponge rubber holding a one-piece felt wick pad against the journal. Lubrication comes from wicking action. Oil level should be at the filler hole in the front of the rubber pad just under the journal collar.



PLYPAK PACKING CONTAINER

Waugh Equipment Co.
420 Lexington avenue
New York 17.

A synthetic-rubber container holding about 60 per cent as much standard waste as needed for the standard packed box, this device exerts proper pressure along journal to assure adequate lubrication. Oil level should be maintained about 1-in. below the journal collar.



Model indicates the relative size of the locomotive and the cars, and shows the single two-wheel idler axle which will sustain weight at the rear of the locomotive. One 12-567C GM diesel engine, mounted conventionally inside the 53-ft locomotive, will furnish 1,325 hp for traction. Current for train heating, lighting and air conditioning will be furnished by generators operated by two GM 6-110 Detroit diesel engines, also mounted within the locomotive body. Top of the cab will be 13 ft, 7 in. above rails. Some details may vary slightly in the final version of the train, which will be shown at the General Motors "Powerama," August 31 in Chicago.

GM Building Complete High Speed Train

New locomotive and new cars being turned out by GM divisions feature new concepts, but GM is not to become a car builder.

Harlow H. Curtice, president of General Motors Corporation, has revealed specific details of the lightweight, low-cost passenger train his corporation was known to have been building. He termed the train a "new concept" in railroad transportation. It will have a capacity of 400 passengers and will be able to operate at speeds over 100 mph for sustained stretches. It will be shown to the public sometime later this year and thereafter will be demonstrated on all major railroads, he said.

The train will consist of 10 coaches and a single 1,200-hp diesel-electric locomotive. It will cost less than $1,000 per seat when built in volume production. Mr. Curtice predicted.

Light Weight Cars

The car bodies will be comprised of steel carlines and purlines over which will be laid an exterior sheathing (above the floor) of anodized aluminum. Below floor level, the sheathing will be steel of a similar pattern.

Because the new type of car body is so low in first cost, it is expected, according to GM spokesmen, to prove more economical to discard a worn-out body and replace it with an entirely new body on the old underframe, than to put the old body through the present expensive practice of rebuilding.

The GM coaches will have a welded steel underframe, so designed as to carry strength out to the sides for maximum safety. A 3-in. space will separate the steel subflooring—an integral part of the frame—from the flooring in the passenger compartment of the cars.

Within this space will be 1 in. of dead air and 2 in. of Fiberglas insulation. The floor itself will be of $\frac{7}{8}$-in. exterior plywood, topped by a $\frac{1}{8}$-in. rubber mat. The seats will be bolted through this and direct to the steel subflooring.

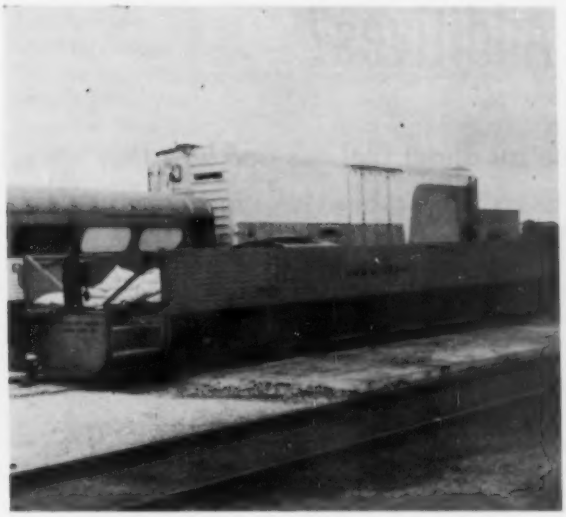
One end of each car will have a vestibule with entrances on both sides. Folding steps are designed to accommodate passengers at both high and low platforms. The other car end will contain a lavatory and an airplane type pantry able to serve up to 40 meals.

Baggage will be carried in compartments under car floors. Thus, while passengers will ride on a higher level, the center of gravity of the coaches will be 10 in. lower than in present railroad equipment.

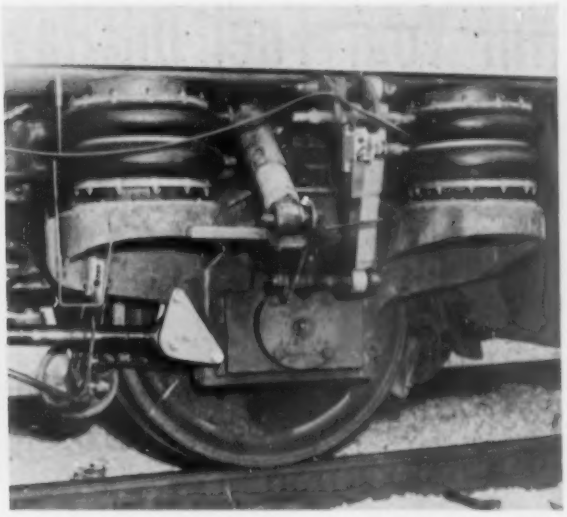
Exterior styling and interior decor have been worked out by the GM styling section. Strength and safety features will be "far in excess" of government and railroad requirements, Mr. Curtice said.

Air Springs

Cars of the new train are adapted from the body design of GM's Truck & Coach division's 40-passenger intercity type highway coach, but are widened 18 in. to give more seating space in the cars and a wider aisle. Like the high-



A sand-bagged test coach, (left) minus superstructure, shows bin-like construction in underframe. Compartments, from left to right, are for vestibule step, truck, air brake equipment, baggage (2), air conditioning equipment, truck and water storage tank. Attached beneath each tightlock coupler will be a box containing all connections needed for air, steam and electric lines. These connections will join automatically upon impact, thus eliminating the need for "coupling up" air and steam lines. Revolutionary truck (right) has single axle and bellows-type air suspension in lieu of conventional steel springs. This is but one of several types being tested by GM engineers; here, it is draped with wires, cables, etc., connected with recording instruments.



way coaches, the cars will have air, rather than spring, suspension and many of the suspension parts will be interchangeable with those used in standard "scenicruiser" highway buses.

The air suspension system will help insulate the coach body from noise and shock of steel wheels on steel rails. This system also aims to provide self-compensation for body variations due to load changes, centrifugal force on curves, etc., thereby providing a level ride. A separate air line from the locomotive feeds the system. An outside rubber cap pedestal mounted between the bellows will support the car body in the event of damage to the bellows or loss of air pressure for the suspension system. The shock absorbers are planned to help dampen lateral and vertical motion.

Because the locomotive will have a dynamic braking system, which GM expects will meet all requirements except holding the train stationary and for emergencies, the composition-shoe single brake on each car wheel will be so seldom used that, GM believes, it should last the life of the car.

Mr. Curtice explained that the train was designed to meet requirements set by a group of railroad presidents who asked car and locomotive builders to explore new ideas in equipment design to cut investment, reduce operating and maintenance costs, lower the center of gravity, increase average speed, improve riding comfort and help reduce the railroad passenger deficit.

Designed as Unit

The committee's challenge gave GM a chance to design an entire train as a unit, said Mr. Curtice. "Here, for the first time, was an opportunity to select the most economical prime mover and match it with a train to obtain the ultimate in utilization and economy," he explained. "The size of the diesel engine, the size of the auxiliary engines, the size and weight of the cars, for example, have been determined by the contribution each makes to the most successful whole, from the standpoint of performance, first cost, operating cost, maintenance, repair costs and safety," he said.

To the requirements of these railroad presidents, GM added one of its own—that existing, proved components should be used in the new train wherever feasible. Because these are already in mass production, this means economy, and because they have been long tested, it means reliability, he stated.

Thus, the new train will have standard GM diesel engines and Electro-Motive generators, traction motors and control apparatus. Car bodies, as stated, will be from GM's Truck & Coach division; air conditioning from GM's Frigidaire division; auxiliary diesel engines for train heating and air conditioning from the Detroit Diesel Engine division, and auxiliary generators from the General Motors Delco Products division, Mr. Curtice explained.

1,200 Hp Locomotive

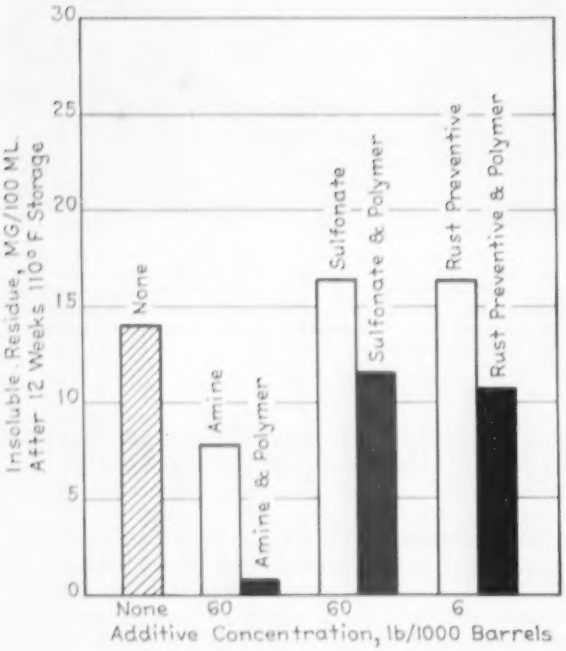
The locomotive will contain a single 12-cylinder GM diesel engine offering 1,200 hp for traction. Fuel consumption will be about 1.3 gal per mile at top speed with full load on level track. The lighter weight and lower center of gravity will permit faster average operating speeds than is possible with present streamlined equipment, Mr. Curtice predicted.

"General Motors has no intention of going into the railroad passenger car building business," he reiterated. "It is primarily interested in the promotion of the use of its diesel motive power and presents the new cars as a service to its customers in the hope that they may offer a solution to the passenger deficit problem."

The new train will be "even more startling" than the GM "Train of Tomorrow" built several years ago, he added.

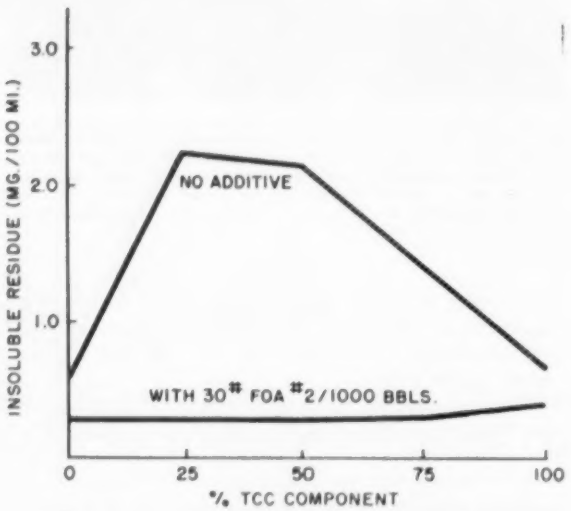
Will Your Fuel Oil Have Additives?

What additives do for diesel fuel oils and how they work. Railroads and refiners have a big stake in these answers.



Mixtures of additives in one fuel oil always showed a reduction of residue formation compared with that formed in the presence of a single additive. However, this was not only the mixture but a stronger concentration as 20 lb per 1,000 bbl of polymer was added.

Summarized here is a discussion that was held during the Corrosion Conference sponsored by the International Nickel Company at Wrightsville Beach, N. C., on May 10, 1955. Illustrations are from E. I. DuPont de Nemours & Company



Mixture of straight-run oil with Thermofor catalytic-cracked (TCC) oil. When 100 per cent of either of these was used, there was considerably less residue than when they were mixed. Addition of an additive reduced the amount of residue over the entire range.

What are fuel oil additives?

Additives are chemical compounds that are added to fuel oils to improve diesel engine performance and economy of operation. Additive-treated low-cost fuels are in some cases found to have a higher BTU rating than conventional fuels, and have reduced fuel consumption while maintaining the same engine horsepower output. There are some fuel oils, however, which will not respond to additive treatment and each fuel must be investigated separately.

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What are the meanings of "economy," "low-cost," "distillate," and "residual" when applied to fuel oils?

"Economy" is a refiners' term and "low-cost" is a railroad term and probably both mean anything that costs less than what is being used now. "Distillate" is that part of a crude that is removed over a fractionating column and is typified by a full distillation range. Formerly only heating was used to do this, but to get greater yields from crude, there are many installations of catalytic cracking units used now. In these a combination of heat and the presence of a catalyst causes portions of the oil that formerly would have been high-boiling to break down and produce still more lower-boiling distillate.

A "residual" fuel is one that is a bottom product from the fractionating column and generally has a greater amount of carbon residue, ash and salts. ASTM has a viscosity classification which causes some mix-up because a distillate can have the same viscosity as a residual fuel, but would not contain as much carbon residue, ash and salts.

•

How are improved performance and greater economy achieved with additives?

Additives can function in one or more of six ways. They can increase stability which means slowing the formation of insoluble residue in fuels and breaking up that residue which has already formed. This prevents sludging in storage tanks, and the plugging of filters in the fuel handling equipment and on the locomotive.

Additives can prevent injector sticking. Cetane rating can be increased. Improved combustion can decrease fuel consumption and smoke production. Corrosion can be reduced by using the proper additives. They can also lower the pour point of fuels.

•

Which of these reasons is most important?

This is changing rapidly, but slowing and breaking up residue formation is probably most important. The fuels supplied today are not the same as the straight-run fuels formerly sold because they do not have the same stability. The complex molecules that broke down in the presence of the catalyst have a tendency to regroup into larger molecules again. Cetane rating measures the time lag between injection and the start of combustion. Higher cetane rating means a shorter lag. However, today the trend is toward lower rather than higher cetane ratings. With the increased interest in lower grade fuels, additives are increasingly attractive because improved combustion can mean less smoke and reduced danger of sparking that might start fires. Corrosion is due to the water and water soluble elements contained in the fuel. Standard additives act only on that portion of the fuel which is oil. A water-soluble inhibitor is the answer to corrosion problems. Lowering the pour point primarily increases the ease with which fuel is handled in cold weather. As more lower grade fuels are used, this is increasingly important.

Is there a single additive capable of doing all these jobs?

No. Some additives may be effective in several categories. The greatest progress has been made in dispersing insolube residues and the least in improving combustion.

•

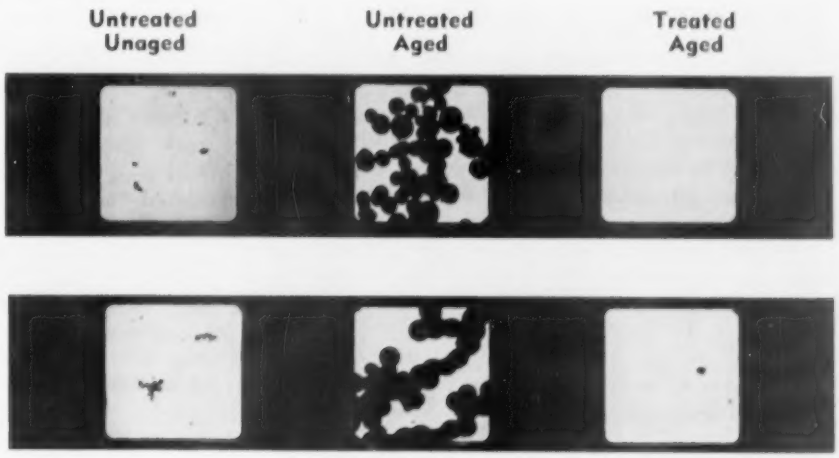
Can "how additives work" really be explained?

Yes. Analysis of residue on filters and varnish on injectors shows that insoluble chemical compounds are formed by reactions between the non-hydrocarbon constituents in the fuel, such as oxygen, sulfur, and nitrogen. Additives are developed to react with the oxygen, sulfur, and nitrogen before they have a chance to react with each other. In addition to preventing chemical action, when the additive reacts with one of these elements, the additive is so soluble in oil that it keeps the material dispersed even after combining with it.

This has been verified in work with the electron microscope. However, it appears that there is need for standardization of these tests and a definite method of rating.

The electron microscope is a most important tool for studying dispersion, but it is only what the user makes of it. Interpretation, sampling, and technique are of prime importance. Some work has been done on correlating conventional light microscope rating with that obtained by the electron microscope.

Close-up on Performance of Fuel Oil Additives



Action of stability additive in a fuel oil prevents the development of an insoluble residue of large molecules that can plug fuel filters and cause injectors to stick. Electron microscope makes possible these photographs which are 4,100 times actual size. The mixture of fuel oils developed the worst condition of sludging if uninhibited, but with proper additive treatment neither sample would give unsatisfactory engine performance. Bureau of Mines work has shown that 12 to 13 weeks storage at 110 F causes same deterioration as one year of normal storage. The 12-week specimens were "heat-aged" to show what their condition would be after a year in a storage tank.

MORE ON NEXT PAGE ▶

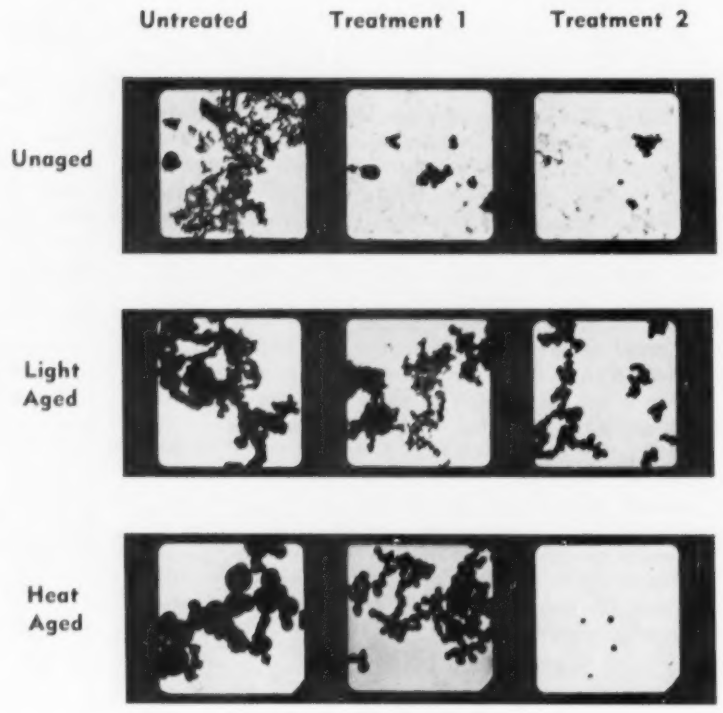
Electron Microscope – Developing

What's It Tell?

In an attempt to develop a method of rapid aging, both the heat-aging previously described and a method that places a sample in a window where it is aged by light have been tried. Treatment 1 used 77 lb per 1,000 bbl of one type additive. Treatment 2 used 40 lb per 1,000 bbl of a second kind. In the photomicrographs of the light-aged fuel every specimen looks bad. Both the untreated and the Treatment 1 fuel did perform unsatisfactorily in the engine. However, the Treatment 2 fuel performed better than the premium fuel.

Heat aging this same fuel duplicates what was shown in engine performance—that the Treatment 2 fuels actually is excellent for diesel service. Better interpretation of electron microscope findings is essential to evaluate fuels properly.

All photographs are 4,100 times actual size.



How are additives classified chemically?

The stability additives which have been rated as most important at the present time are divided into three chemical types—polymers with basic maino-nitrogen groups, petroleum sulfonates which contain a metal such as odium or barium, and also highly alkyl surface-active amines.

•

What concentrations of these additives are effective?

For the stability additives just classified, the following concentrations are typical:

	Lb per 1,000 Bbl.	Pints per 1,000 Gal.
Polymers	10 to 60	0.3 to 1.5
Sulfonates	50 to 150	1.2 to 3.6
Alkyl amines	15 to 75	0.4 to 2.0

•

How should additives be put into fuel oils?

Generally speaking it is most effective and economical to add them at the refinery before the fuel begins to deteriorate. Lower concentrations can do the job when the fuel is fresh. However, a jobber or user can put them in. While a refinery should be in a good position to know what additive is needed, in some cases a railroad may have a special problem that is best solved locally.

If fuel oils from different sources are mixed in storage tanks, the effectiveness of the additive may be minimized and may not prevent sludging.

•

Does long storage affect the stability of additive-treated fuels?

Tests indicate that higher concentrations of additive increase the storage stability, although this varies with each fuel. However, usually a minimum of additive is used. Higher temperatures in the South accelerate this deterioration. Storage over water, and the metal walls of storage tanks have been considered in devoloping additives.

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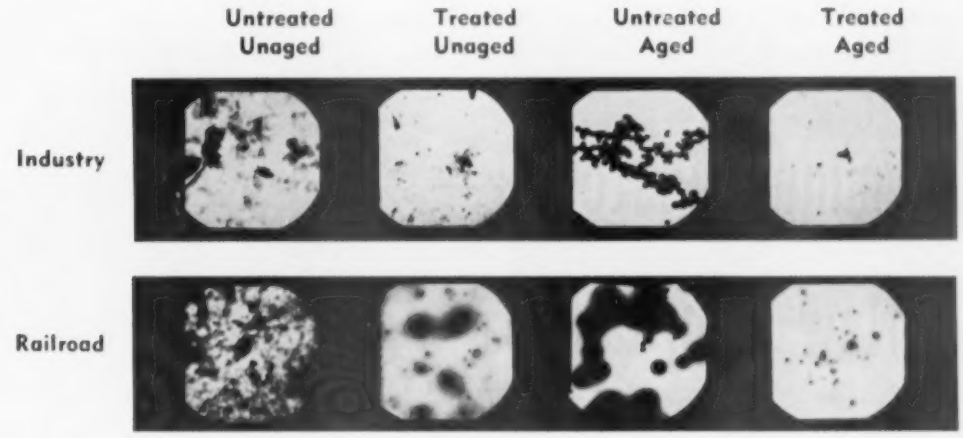
Can fuel oils with different additives be mixed without bad effects?

Indications are that the incompatibility of fuels and not of the additives is most important. Tests have shown that mixtures of additives in oils always served to further reduce the amount of insolube residue. However, when oils from two sources are mixed, greater amounts

As A Tool for Fuel Oil Research



How's It Done?

Technique of taking electron microscope photo-micrographs is illustrated in a series made by Denver & Rio Grande Western Railroad technique and by DuPont technique of the same fuel oil. The unaged and untreated fuel was suspected of causing injector sticking and was classified by the micrographs as a borderline fuel. Additive treatments were quite effective in dispersing residue in the unaged fuel. After light-aging the fuel would be considered poor in the uninhibited condition. However, without storage and without treatment this fuel oi operated satisfactorily in locomotive service and did not cause any injector sticking. Comparison of techniques in the inhibited samples was fair and indicates the need for standardization of methods of examination and a concrete method of rating. All photographs are 4,100 times actual size.

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of residue developed than are present in either of the oils alone.

•

Are special equipment or extra precautions needed to burn treated oils?

Generally conventional lower-cost distillate fuels do not require any special equipment. Preheating is desirable with residual type fuels to increase the ease of handling.

However, additives have been developed which have been operating with fuel temperatures up to 700 F, so preheating should not destroy their effectiveness.

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Does preheating of additive fuel oils aid in their burning?

It is not required to aid any chemical reaction that occurs during burning. However, high-pour point oils and residuals can be more readily pumped if their viscosity has been lowered by pre-heating.

•

Do additives present any safety or health hazard?

Present stability additives are no more toxic than the fuels in which they are used. In the future this may change and all additives should be handled with care.

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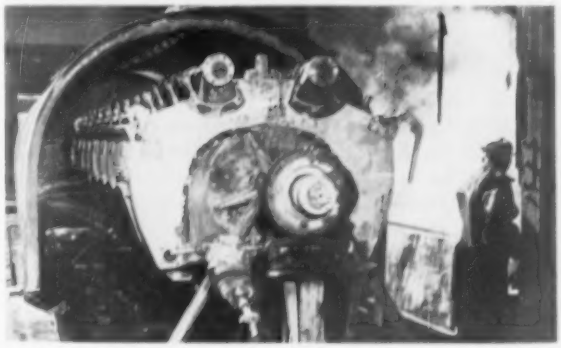
Is there a test to tell if a fuel oil is additive-treated and to identify the additive?

No. A spectographic analysis may identify metals that are contained in the sulfonate type additives. There are specific tests for determining some of the other types of additives, but an indication of what might be expected is necessary before such a test can be made.



A new type diesel engine cleaner developed at the Union Pacific's shops in Portland, Oregon, cleans and rinses crankcase assemblies in 30 minutes—a job that used to take one man 8 hours with a hand-operated steam cleaner.

Aluminum Pistons— A New Approach

This metal has weight and thermal conductivity that are fine for diesel engines, but it softens when heated. For successful pistons it requires special treatment.

By C. G. A. ROSEN

The two materials usually selected for diesel engine pistons are cast iron or aluminum alloy. A designer chooses aluminum for piston construction because of two outstanding properties it provides in an internal combustion engine. First, aluminum is light in weight. For equal sections, cast iron is 2.75 times as heavy as aluminum. In higher speed diesel engines it is essential to hold down inertia forces in order to lengthen the life of bearings and connecting rod bolts, and to reduce piston skirt friction. Aluminum alloys best satisfy these requirements.

The second advantage of using aluminum alloys for pistons is its very high rate of heat conductivity. Aluminum has 4.25 times the conductivity of cast iron. The ability of the piston to transfer heat from the crown above which the fire is built down to the skirt where it is transmitted to the cylinder wall is very important. High heat conductivity and low weight are the two important characteristics of aluminum-alloy diesel-engine pistons.

The most serious problem associated with the aluminum-alloy piston is the life of the top ring groove. This top groove serves as a valve seat for the ring. The ring and ring groove form a valve and seat that prevent the passage of the hot gases from the combustion

This paper was presented at the AAR Mechanical Convention in Montreal on June 23, 1955. Mr. Rosen is a consulting engineer for the Caterpillar Tractor Company, Peoria, Ill.

Figure 1. With a stainless-steel reinforced top ring groove applied by the Darcey process this piston has seen 500,000 miles of locomotive service.

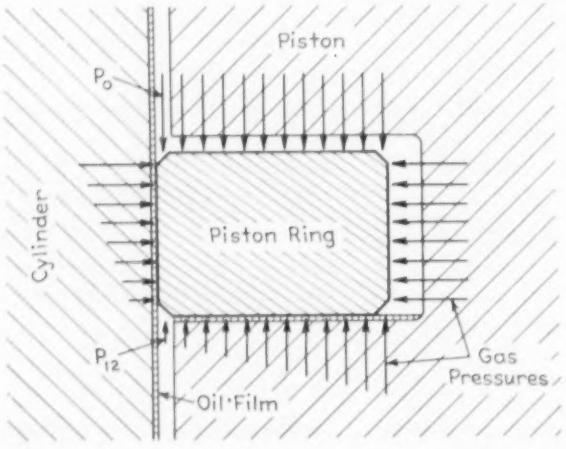


Figure 2. Piston ring seating properly on the cylinder wall and ring groove shows this pressure distribution.

zone down into the crankcase through the labyrinth of rings and past the skirt of the piston (Fig. 2). As a valve, the ring has two critical surfaces. One is the seat on the lower surface of the ring groove and the other is that between the piston ring and the cylinder wall. The pressure gradients are illustrated under conditions when both are sealing properly.

If the top ring loses either seat, the high temperature

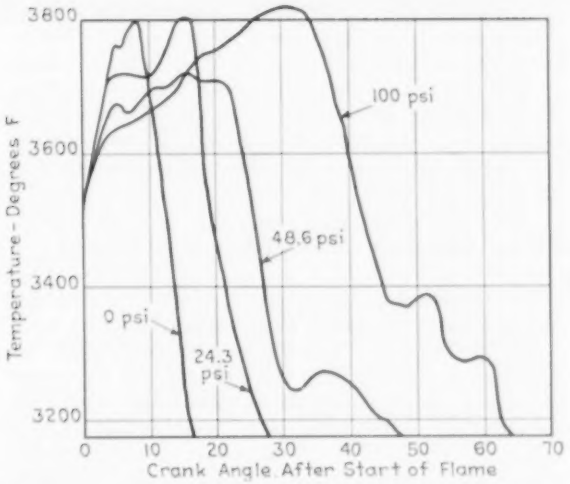


Figure 3. Changes in the combustion process which increase brake mean effective pressure expose piston to longer periods of high temperature.

gases (Po), sometimes as hot as 3800 F, sweep down and act as a torch in burning out the piston metal next to the narrow clearance space between the piston and the cylinder wall. When this occurs, the piston fails because of burned-out ring grooves.

Ring Groove Deterioration

What are the forces influencing piston and ring groove deterioration? The combustion gases are very hot. They have this high temperature for considerable periods of time which vary with the combustion process (Figure 3). Fuels have an effect on these temperatures. After-burning, which occurs in some diesel engines because of certain fuels, affects the amount of heat absorbed by the piston and the length of time during which that heat has a deteriorating influence. For both aluminum and cast iron pistons, the temperature gradient is very steep in the ring groove area, but flattens considerably as heat is extracted form the skirt by the cylinder wall. In diesel engines, aluminum piston crown temperatures range from 575 F down to 400 F depending on the design and combustion system. In the combustion zone, temperatures can be as high as 750 F at the center of the piston. The influence of the combustion process is quite evident on the temperature gradients prevailing in the piston itself.

The effect of repeated heating from the combustion process, or the combined influence of temperature and time on the hardness of an aluminum alloy locomotive piston is revealed in Fig. 4. This piston which had operated in a locomotive was checked for hardness around the top ring groove. The original metal had a hardness between 110 and 220 Brinell. This had softened above the top groove to 49 Brinell. Referring to Fig. 5, a special alloy was tested and the rate of softening with respect to temperature and time was determined. It can be seen that temperatures of 550 F acting on the ring zone for 2,000 hours can soften aluminum from 115 Brinell down to about 37 Brinell. Probably the piston with a 49 Brinell was softened by a temperature of 485 F in the ring groove section. It is far too soft for the ring to maintain a suitable surface on the groove and preserve

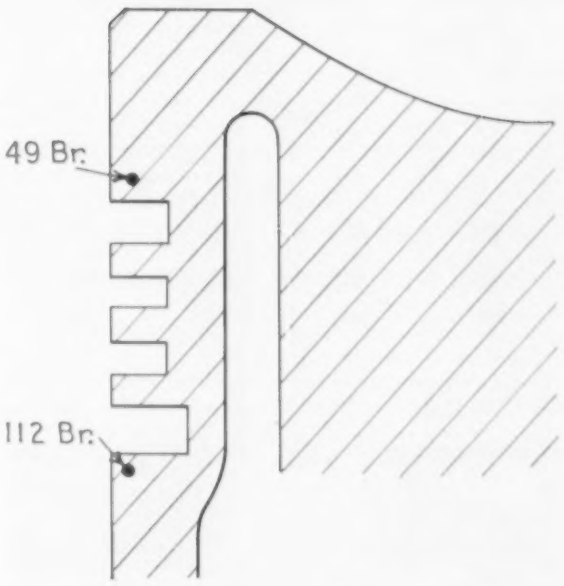


Figure 4. After service in a locomotive, this piston with an original hardness up to 220 Brinell had softened as shown.

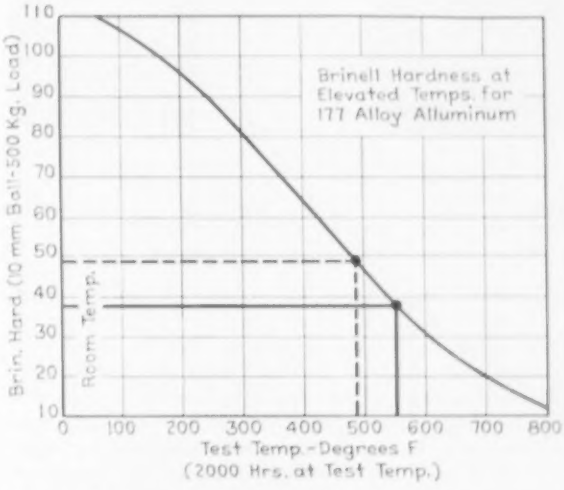


Figure 5. Laboratory test shows that the higher the temperature to which aluminum is exposed, the softer it will become.

a proper seal. When the aluminum is softened to the extent revealed in this piston, it is easy to understand how the top ring groove can fail.

Assumes Tapered Form

By setting up a used piston on a surface plate and determining the form of the groove with a surface gauge after several thousand hours of operation, it will be found that the groove has assumed a tapered form. The lower and upper surfaces of the ring groove have a very wavy profile. It is simple to understand how leakage and blow-by can occur in such a groove because the valve seat has been lost. Before such drastic failure occurs, the ring will beat out the ring groove so that the valve seat begins to lose its sealing ability. The loss

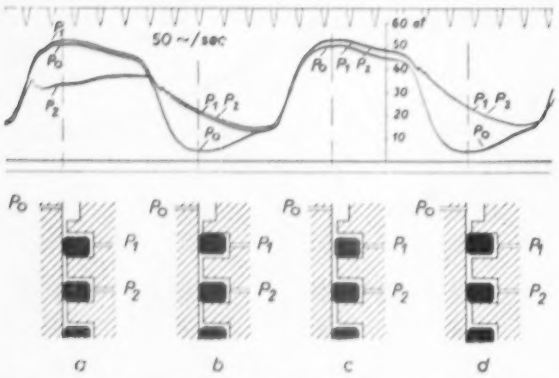


Figure 6. Pressure variations during the strokes of a diesel engine cause rings to move in the grooves.

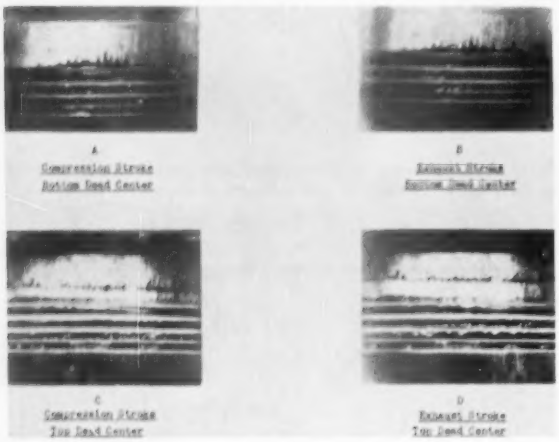


Figure 7. Glass cylinder in a diesel engine made it possible to take these photographs showing lubricating oil distrubution.

of seal not only permits the passage of blow-by gases, but also ruins the oil control of that particular piston. Particularly in the 4-cycle engine, the top piston ring is the most important for controlling oil consumption. When the seating of this ring in its groove is impaired, oil consumption starts increasing and oil rings have little effect. Primarily the oil rings act as scrapers for removing surplus oil from the cylinder walls and do not control lubricating oil consumption.

The tightness of the ring seal and the ability of the piston skirt to carry heat away through the cylinder walls are determining factors in the length of time the top ring can maintain its seat in the groove. If the piston and rings are effective channels for carrying heat into the jacket, the ring groove life will be lengthened. Tests have indicated how important heat transfer through the skirt can be in maintaining the life of the top ring groove. A trunk piston was fitted to a cross-head type engine. The skirt no longer served to transfer heat from the crown of the piston to the jacket. The piston reciprocated loosely in the bore and had no side thrust. With no side thrust, the surface of the piston did not rub against the cylinder wall with sufficient pressure to be an effective means of transferring heat. Under this condition, the top ring groove temperature reached 545 F. When the piston was installed in a normal engine the side thrust from the connecting rod reduced the top ring groove temperature to 460 F. In another test a piston with a cam ground skirt was fitted very closely to the bore. The low clearance provided a very efficient means of heat transfer. Under this condition the temperature of the top ring groove dropped to 360 F. This is important when considering the influence of repeated heating on the softening of the aluminum at the top ring groove.

Forces Acting to Cause Ring Groove Wear

To understand the dynamic forces acting on a piston ring that cause it to flutter or to impact the groove refer to Fig. 6. This shows a diagram of pressures acting on the rings in different positions and indicates the forces which can move the ring in its groove. In diagram A the rings are shown in the position which they occupy at the top center after the piston has come up on the compression stroke. The cylinder gas pressure indicated as P_0 has access to the top ring groove and is nearly equal to P_1 because the compression and the early stages of combustion influence the gas pressure behind the ring. P_2 is the pressure behind the second ring and is the same through the space between the lower edge of the top ring and the lower face of the second ring. This usually amounts to about half the cylinder gas pressure P_0. If P_0 is around 800 or 900 psi, P_2 would be around 400 to 450 psi. As the piston moves downward on its stroke and approaches position B, bottom dead center, P_0 and P_1 drop during the expansion until pressure P_2 is the same as P_1. From this point downward, P_0 continues to drop, and the gas trapped in the space P_2 becomes higher than P_0. The pressure of 400 psi or more in space P_2 causes the ring to lift and slams the top ring against the groove. If the aluminum has been softened by repeated heating it is easy to see how the ring will swage out the groove.

The sulphur content of the fuel has a decided influence on cylinder wear. Cylinder wear makes it more difficult for the ring to seal properly. If the ring must follow a tapered or out of round bore caused by high sulphur corrosion, the ring groove will be worn by the movement between the ring and the groove. Ash content in a fuel has its influence. Here again a direct abrasive action between the ring and groove and the ring and wall ultimately upsets the ideal ring sealing capacity. Materials must be selected for rings and for the piston ring groove which will resist wear caused by impact, by temperature, by friction and by abrasion.

There is also the problem of oil distribution in the ring belt and in the upper recesses of the piston ring travel. This is illustrated by photographs in Fig. 7 which were taken of an operating engine fitted with a glass cylinder. The photographs suggest the function of rings in oil distribution. There is an ample supply of lubricant at bottom dead center, but very little at top center. At all times only a small amount of oil seems to have worked above the top ring. Whatever oil is available is located on the bottom half of the land on the upward stroke. The largest amount of clean area on the upper part of the land occurs during the exhaust stroke. On the down stroke of the piston, oil covers the entire first land. The oil is delivered immediately to the first land at the beginning of the intake stroke. There is no apparent horizontal motion of the oil trapped on this land.

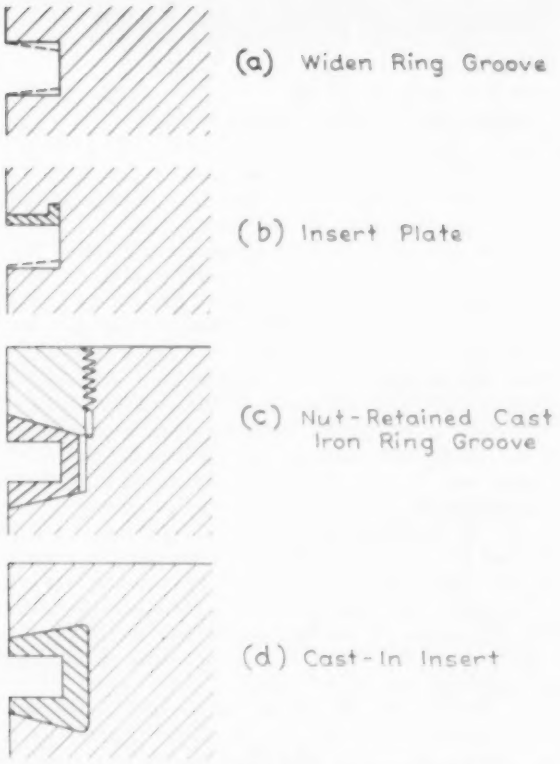


Figure 8. Four solutions to the problem of reinforcing the top ring groove of an aluminum piston.

Oil covers the second land in the following manner: on the exhaust stroke the lower two-thirds is covered with oil; on the intake stroke the land is entirely covered with oil; on the compression stroke the lower two-thirds is covered with oil; on the power stroke the land is entirely covered with oil. Oil located in the second land has a slight motion from right to left at top center on the compression stroke. The oil appears to remain stationary on all of the other strokes.

Piston Design

This situation in aluminum pistons could cause one to speculate on what might be accomplished to achieve the perfect piston with all of the characteristics which should provide maximum performance and life. An ideal piston would be one which would have an aluminum skirt and a ring band section approaching the hardness of cast iron. A ring carrier section could be made of cast iron or hardened stainless steel. Stainless steel has wear resisting properties which, would prove highly advantageous if used for the whole ring band section. The crown of the piston should be made of stainless steel or some heat resisting metal to withstand the desired temperatures in the combustion chamber envelope. Such a piston, however, would be extremely expensive, would be very heavy, and create high inertia forces, and would be commercially uneconomical.

The best compromise for a piston would be to provide the top ring groove with a surface which is sufficiently hard to withstand the wear and impact of the top ring and still preserve smoothness of surface. The ring can then function properly by expanding and contracting in its groove in relation to cylinder bore distortion and to the gas pressures exerted behind the ring.

What methods have been attemped to cure this problem? Fig. 14 shows four methods which have come into use. Fig. 8a shows the simple expedient of widening the top ring groove and installing a wider piston ring in it. This, however, does not solve the problem of the softened aluminum in the seat against which the piston ring must ride. Also, the geometry of the ring has changed, and the wider the ring in the top ring groove, the greater the danger of scuffing. Scuffing seems to be initiated from the center of the ring outward, and the wider ring is more vulnerable to it.

As shown in Fig. 8b, some pistons have been provided with an insert plate which is sprung into the top groove after undercutting it. This locks the insert plate in position. This method reinforces the top surface of the ring groove but does not solve the problem of softened material at the bottom of the groove. Some of this must be removed in order to install a new ring.

In Fig. 8c a cast iron or ni-resist ring is held in place by a nut forming part of the piston crown itself. The problems of expansion and contraction make this setup short-lived. It is an improvement and can justify itself in some cases, but in addition to short life, it is not capable of withstanding the severest type of service where expansions are beyond normal limits. In Fig. 8d is shown a very common method using a cast-in insert made of ni-resist or of cast iron. The insert is coated with a suitable material such as aluminum or zinc and following heating is placed in a mold after which the aluminum is poured around it.

The Darcey Process

In Fig. 9 is shown the Darcey metal spray process that provides a stainless steel surface in the top ring groove which can be hardened. In order to anchor and retain

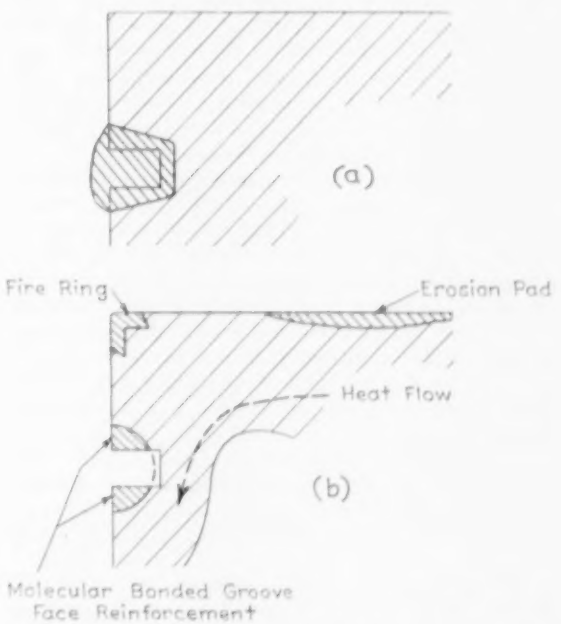


Figure 9. Darcey process can provide hardened wear surfaces without inserts or complicated machining.

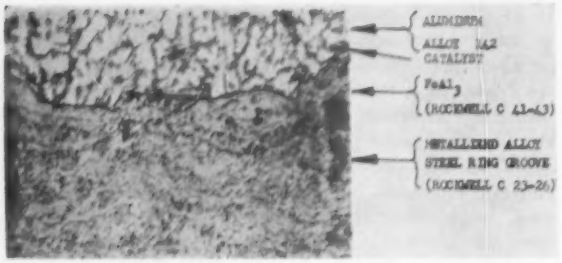


Figure 10. Bond produced between aluminum and stainless steel by the Darcey process is shown by this photomicrograph.

such a surface it is essential that there be a molecular bond between the stainless steel and aluminum. It is well-known that to provide a molecular bond between two dissimilar materials it is essential that there be a high degree of molecular activity when the two metals are brought together. They become firmly bonded by dispersion of the steel molecules among the molecules of aluminum and vice-versa. In the Darcey process the temperature at the surface of the aluminum is raised to such high values instantaneously that the aluminum is (vaponized.) At this time a catalyst surface is applied which makes a molecular bonding so complete there can be no separation of the catalyst and the aluminum. Similarly a deposit of stainless steel is made over the catalytic film. The aluminum and steel form a unified material and under pressure and temperature act as one element.

The character of the bond makes it possible to correct a number of piston problems. For instance, the edge of the piston crown can be reinforced by a fire ring. This is of great advantage in two-cycle engines because this edge uncovers either exhaust or air intake ports. It does preserve the edge and makes the piston a more accurate timing valve. Molecular bonding makes it possible to deposit stainless steel in locations where groove wear is heaviest. There is no need for depositing wear resisting material in the back of the groove. The edge closest to the cylinder wall has the highest bearing pressure, and a secure bond makes possible the ring groove shown in Fig. 9b. In some pistons, combustion-process erosion on the top of the piston crown can be offset in by the deposit of an erosion-resistant pad.

The stainless steel used is a special composition having expansion characteristics very similar to aluminum. In its molten stage it reacts with the aluminum through the action of the fluxing catalyst. The control sequence of the process governs the dispersion of the steel into the aluminum as shown in Fig. 10. At 75 magnifications it can be seen that a molecular bonding has taken place. In the process temperature control yields a steel that can be machined but still has a surface which will be highly wear resistant. The method involves no static casting or plating techniques.

The experience gained in over four years of experimental work indicates considerable value in salvaging pistons as well as providing new long-lived pistons. In Fig. 1 a piston is shown which has operated over 500,000 miles.

The ring groove wear is so slight that it is impossible to predict the time at which this piston will require changing. Undoubtedly the piston will be replaced because of some other type of failure.

Decisions of Arbitration Cases

Car Damaged By Train Parting and Running Together

The rear of a freight train ran into the front part after a broken knuckle at the back of the 100th car caused the parting of a 116-car Gulf, Mobile & Ohio train near Burkville, Ill., on June 4, 1953. The 101st car, Chicago & Eastern Illinois hopper 89260 loaded with iron ore, was badly damaged with repairs estimated to cost $3,000. The center sill broke back of the bolster and was shoved toward the middle of the car. The C&EI claimed that this was a collision under Interchange Rule 32, paragraphs 10(c) and 10(d), and that the handling line was responsible. It was said that the train was made up with loads at the rear and empties at the front causing unequal braking, and that the locomotive had no trainline flow indicator which would have shown the parting. It was mutually agreed that damage to the center sill exceeded that specified in Interchange Rule 44, but the damage resulted from fair usage according to the GM&O. Because there was no unusual handling enroute, no derailment, and air was not applied from the rear end, no Rule 32 conditions were involved. Instead the GM&O stated that Rule 120 was applicable, making the damage the owner's responsibility.

On October 14, 1954, the Arbitration Committee decision sustained the contention of the GM&O that there was no evidence that the car had been subjected to any unfair conditions specified by Rule 32.—*Case 1846, Chicago & Eastern Illinois vs. Gulf, Mobile & Ohio.*

Responsibility for Car Damaged by Fire

On December 9, 1952, Fruit Growers Express refrigerator car 59782 was discovered on fire enroute over the Seaboard Air Line near Withla, Fla. The car was set out, the fire extinguished, and damage was found to total $1,262.53. The car had traveled about 35 miles after being loaded with oranges at Lake Whales, Fla. The fire resulted from failure of a bearing on the Preco air circulating fan in the B end of the car. Drive for this fan is a rubber tire on a wheel of the car with the remainder of the belt-driven fan mechanism located inside the car body. The fan had been inspected by FGE forces prior to loading. The Seaboard contended that because the fan is not maintained or serviced by railroads, and because its concealment prevents any inspection, the responsibility for all the damage was that of the owner, Fruit Growers Express. In this the car would not come under Interchange Rule 32, Paragraph 10(k). The Fruit Growers said that they do not maintain fans after the car goes to a railroad, and under Interchange Rule 1, paragraph (a), "Each railroad is responsible for the conditions of all cars on its line, and must give all equal care as to inspection and lubrication."

Decision by the Arbitration Committee on April 28, 1955, ruled that the car owner was responsible for all damage to the fan arrangement, and the railroad was responsible for all resultant fire damage to the car. Decision 1704 is applicable to this case the Committee stated.—*Case 1847, Fruit Growers Express vs. Seaboard Air Line.*

Programs of Coordinated Mechanical Associations

HOTEL SHERMAN, CHICAGO

September 12, 13 and 14

Exhibit

Tuesday afternoon, September 13, has been set aside for the inspection of the mechanical products on exhibit at the Hotel Sherman under the auspices of the Allied Railway Supply Association, of which D. F. Hall (Hunt-Spiller) is president and C. F. Weil is secretary-treasurer. This period will also afford an opportunity to visit the Machine Tool Show.

Coordinating Committee Officers

The officers of the Committee of the Coordinated Associations which consists of the presidents and secretaries of the railway associations and the exhibiting organization, are: Chairman, J. P. Morris, general manager, mechanical department, Santa Fe; J. O. Welsch, general superintendent motive power, ICen; J. L. Robson, chief mechanical officer, GN, and Secretary C. F. Weil.

Allied Railway Supply Association

TUESDAY, SEPTEMBER 13

Presidents Luncheon

Speaker: William M. Keller, executive vice-chairman and director of research, AAR Mechanical Division

Air Brake Association

Crystal Room

MONDAY, SEPTEMBER 12

10 am

Address by President C. V. Miller, general supervisor air brake, New York, Chicago & St. Louis.

Foundation Brake Gear—Central Air Brake Club.

Economics of Good Freight Brake Maintenance—Manhattan Air Brake Club.

2 pm

Recent Developments in Air Brake Control—Westinghouse Air Brake Company.

Report of Committee on Standardization of Air Brake Equipment for Diesel and Turbo Electric Locomotives—Chairman, A. M. Malmgren, general diesel and air-brake supervisor, St. Louis-San Francisco.

Report Approved Maintenance Practice Committee—3CD Compressors, P-3 Decelostat Equipment and Angle-Cock Conversions. Chairman, F. W. Dell.

TUESDAY, SEPTEMBER 13

9 am

Paper by representative of the New York Air Brake Company.

1954 "Convention in Print." Members requested to be prepared to discuss or raise questions regarding same.

Main Reservoir Safety Valves for Diesel Locomotives: Location, Maintenance and Testing—Pittsburgh Air Brake Club.

WEDNESDAY, SEPTEMBER 14

9 am

Joint meeting with the Railway Fuel and Traveling Engineers Association. Subjects:

Air Brake Troubles in Cold Weather—Montreal Air Brake Club.

Maintenance and Lubrication of CD Type Air Compressors—St. Louis Air Brake Club.

2 pm

Election of Officers, reports of committees, and discussion of subjects for 1956 convention.

Question Box. Some member of the association will be requested to answer questions dropped in box provided at speaker's stand, or other convention location. Member's name and title desirable, but not necessary.

Car Department Officers' Association

Louis XVI Room

MONDAY, SEPTEMBER 12

10 am

Address by President R. Schey, general superintendent car department, New York, Chicago & St. Louis.

Report of Committee on Light Repair Tracks and Train Yard Operation—J. Hansen, assistant superintendent car department, Chicago, Milwaukee, St Paul & Pacific.

2 pm

Address (speaker not named)

Report of Committee on Interchange and Billing for Car Repairs—C. W. Kimball, chief of car inspection, Southern.

Report of Committee on A.A.R. Loading Rules—J. M. Hick, general car foreman, Great Northern.

Report of Committee on Construction, Maintenance and Upgrading of Freight Car Equipment—E. D. Fortune, car foreman, Atchison, Topeka & Santa Fe.

TUESDAY, SEPTEMBER 13

9 am

Report of Committee on Wheel Shop Practices—E. N. Spencer, wheel shop foreman, Illinois Central.

Address (speaker not named)

Report of Committee on Car Lubrication—W. J. O'Brien, general car foreman, Nickel Plate district, New York, Chicago & St. Louis.

Comments by W. M. Keller, executive vice-chairman and director of research, Mechanical Division, AAR.

Car Department Officers' Association *(Continued)*

WEDNESDAY, SEPTEMBER 14

9 am

Report of Committee on Maintenance of Passenger-Car Equipment—W. E Symons, assistant general mechanical superintendent New York, New Haven & Hartford.

Report of Committee on Air-Conditioning Equipment—Operation and Maintenance—R. E. Johnson, general electrical foreman, New York, Chicago & St. Louis.

Report of Committee on Painting—Basic Preparation of Painting Railway Equipment—R. C. Fisher, foreman painter, Cleveland, Cincinnati, Chicago & St. Louis.

2 pm

Report of Committee on Maintenance and Servicing of Mechanical equipped Refrigerators Cars—M. B. Adams, assistant supervisor diesel engines, Atchison, Topeka & Santa Fe.

Miscellaneous reports; lection of officers.

Locomotive Maintenance Officers' Association

Grand Ball Room

MONDAY, SEPTEMBER 12

10:30 am

Report of Committee on Personnel Training. Chairman C. A. Love, assistant superintendent machinery, Louisville & Nashville. *Topic:* The Foreman Problem, Present and Future.

Address by Hon. Owen Clarke, member, Interstate Commerce Commission.

2 pm

Report of Committee on Diesel Maintenance Mechanical. Chairman H N. Chastain, division master mechanic, Atchison, Topeka & Santa Fe. *Topic:* Power Assemblies and Bearings.

Report of Committee on Diesel Material Reconditioning and Control. Chairman J. J. Ekin, Jr., assistant to general superintendent motive power and equipment, Baltimore & Ohio. *Topic:* Repairs and Reclamation of Diesel Parts in Railroad Shops.

TUESDAY, SEPTEMBER 13

9 am

Report of Committee on Shop Planning. Chairman R. E. Harrison, supervisor diesel locomotive maintenance, Southern Pacific. *Topic:* Fullest Possible Use of Existing Shop Facilities.

WEDNESDAY, SEPTEMBER 14

9 am

Report of Committee on Diesel Electrical Maintenance—Running. Chairman W. C. Monk, supervisor diesel equipment, Canadian National. *Topic:* Control of Electrical Delays and Ground Relay Action.

Report of Committee on Shop Practices. Chairman O. L. Hope, mechanical superintendent, Missouri Pacific. *Topic:* Diesel Axle, Wheel and Truck Maintenance.

2 pm

Report of Master Boiler Makers' Section—Chairman H. M. Schudlich, engineer of water service, Northern Pacific. *Topics:* (1) Study of the effects of Oil in Feedwater of Locomotives and Stationary Boilers and Water in Diesel Cooling Systems, with Recommendations of Methods to Eliminate same. (2) Water and Steam Conditioning for Package Boilers and Stationary Water-Tube Steam Generators.

Address by John A. Hall, director of Bureau of Locomotive Inspection Bureau of Safety and Service, I. C. C. *Topic:* Good Inspection Means Good Maintenance.

Report of Committee on Diesel Maintenance General. Chairman F. E. Stubbs, assistant diesel superintendent, Southern. *Topic:* A Positive Electric and Mechanical Diesel Maintenance Program.

Railway Fuel and Traveling Engineers Association

Bal Tabarin

MONDAY, SEPTEMBER 12

10 am

Address by President W. H. Fortney, district road foreman of engines, Cleveland, Cincinnati, Chicago & St. Louis.

Report of Secretary L. H. Peters.

Address by D. A Fawcett, resident vice-president, New York Central System.

Safety—J. H. Williams, superintendent safety, Texas & Pacific.

Open discussion on Waste Fuel Oil at Service Stations.

Loss and Damage Due to Rough Handling—C. A. Naffziger, director, Freight Loss and Damage Prevention Section, AAR.

9 am

Diesel Question and Answer Panel—Representatives of Electro-Motive Division, General Motors Corporation; American Locomotive Company, General Electric, Baldwin-Lima-Hamilton Corp., and Fairbanks, Morse & Co.

TUESDAY, SEPTEMBER 13

9 am

Diesel Failures—Cause and Remedies. Chairman R. R. Rich, road foreman of equipment, Chicago, Rock Island & Pacific.

Coal Fired Steam Turbine Locomotive—L. M. Newton, mechanical inspector, Norfolk & Western.

Operation of Diesel Locomotives in Extreme Cold Weather—E. Erickson, diesel road foreman of engines, Canadian National.

Method of Educating Locomotive Personnel—S. E. Back, Pennsylvania.

Possibilities of Burning Lower Cost Diesel Fuels and Effects of Their Use—Ray McBrian, engineer standards and research, Denver & Rio Grande Western.

WEDNESDAY, SEPTEMBER 14

9 am

Joint meeting with Air Brake Association. Subjects:

Air Brake Troubles in Cold Weather—Montreal Air Brake Association.

Maintenance and Lubrication of CD type air compressors—St. Louis Air Brake Club.

Open Discussion on Freight-Train Handling.

2 pm

Official business—Results of election, etc.

Trouble Shooting on Clarkson-Vapor Steam Generators—Chairman R. H. Francis, general road foreman equipment St. Louis-San Francisco.

Oil-Burning Gas-Turbine Locomotive—C. Shipman, road foreman engines, Union Pacific.

Electrical Section

Establishing New Standards

Vice Chairman Gordon presents the Chairman's Medal to R. I. Fort.

The Section continues to take on added work and is completely revising its Manual

■ Under the guidance of its Chairman, R. I. Fort, the conduct of the three-day meeting of the Electrical Section, A.A.R., held in Montreal, Canada, June 20-23, resembled that of a single large committee, in which the members were all interested in the subjects at hand. Discussion was lively, but very little of it was caused by someone misunderstanding the intent of a report. Contents of the reports covered many new developments in the field of railroad electrical applications and extended sections of the same reports consisted of material for the Section's Manual which is being completely revised and rewritten. The reports are probably the most informative and useful ever compiled by the Section.

The opening session on Monday morning consisted of a joint meeting of the section with the Mechanical Division, A.A.R., which was addressed by C. N. Crump, president, Canadian Pacific; R. G. May, vice president, operations and maintenance department, A.A.R., and D. S. Neuhart, chairman A.A.R. Mechanical Division and general superintendent, motive power and machinery, Union Pacific.

Mr. Crump stressed the importance of free private competition in establishing the prosperity of any country and the welfare of its people.

With reference to the Electrical Section, Mr. May said, "The close working arrangement with the Electrical Section has solved many of the problems arising in connection with additional improvements in the electrical and electronics field for the mechanical officer."

Speaking of the railroad business, Mr. Neuhart said, "It requires that we join ranks as one to improve our service and our economic status as a whole."

The Electrical Section meetings were opened by Chairman R. I. Fort, electrical engineer, equipment, Illinois Central. He extended thanks to committee members and others for the work they had done and in explaining the need for active discussion, he said that the reports, however, excellent, need to be refined in the fire of open discussion. Organizations, he added, can suffer more from easily satisfied people than from inefficient or mediocre ones.

Vice Chairman K. H. Gordon, assistant electrical engineer, Pennsylvania, presented the chairman's medal to the retiring chairman, R. I. Fort.

E. K. Goldschmidt, manager, Chicago Office, Safety Car Heating and Lighting Company, presented a gavel to Mr. Fort, and pledged the cooperation of the Railway Electric Supply Manufacturer's Association to the Electrical Section.

K. H. Gordon outlined the activities and decisions of the Committee of Direction taken since the 1953 meeting

E. K. Goldschmidt assures the Section of the continuing support of the Railway Electric Supply Manufacturers Association.

ELECTION OF OFFICERS

New officers elected to serve during the coming year are: Chairman: K. H. Gordon, assistant electrical engineer, Pennsylvania. Vice Chairman: S. B. Pennell, assistant engineer, New York Central.

Members, Board of Direction: E. J. Feasey, general supervisor of diesel equipment, Canadian National and J. J. Schmidt, electrical engineer, Denver Rio Grande Western.

R. I. Fort
Chairman

K. H. Gordon
Vice-Chairman

S. W. Marras
Secretary

in Atlantic City, N. J. The Manual, he said, is to be completely revised and reprinted, a part of this work having already been accomplished. He announced that the 1956 meeting of the section would be held in June, in Chicago, with exhibits.

The report of the Committee on Coordination with the American Standards Association's Committee 7, was presented by L. B. Curtis, assistant engineer, office of electrical engineer, Pennsylvania. This committee is now considering various phases of the use of aluminum conductors.

S. B. Pennell asked if the use of butyl rubber insulation would result in an appearance reduction of the size of the wire.

T. G. Isel, assistant car equipment engineer, Pullman Company, said that since butyl will stand a higher temperature and may be a better conductor of heat, a slightly smaller wire size might be permissible. This, he said, however, has not been determined.

Mr. Fort inquired about a new type of insulated wire being used by the Electro-Motive Corporation, and it was explained that the wire which does not require conduit has been used on locomotives for about a year.

Mr. Isel asked if it were the committee's intention to study synthetic wire designed for direct burial. Mr. Troop replied that further study by the committee may include such conductors.

C. R. Troop describes properties of new types of wire and cable.

Wire, Cable and Insulating Materials

The report was presented by C. R. Troop, assistant engineer, New York Central. The committee report states that at the Annual Spring Meeting of the American Society for Testing Materials proposed for letter ballot an ozone-resistant type tape for use on high voltage installations. There are as yet no existing standards for plastic or neoprene tapes.

During 1954, the American Standards Association adopted a specification for weather resistant wire and cable-polyethylene type.

Also during 1954, the ASTM adopted a specification for ozone resisting butyl rubber insulation for wire and cable. This provides for an insulation with many properties such as heat resistance, moisture resistance, ozone resistance and insulation values equal or surpassing the various compound specifications listed as AAR, Electrical Section Specification No. 1000.

Discussion was opened by R. H. Russell, electrical engineer, Great Northern, who said that if AAR cable is ordered, the purchaser would not be sure of getting the best cable. He said there are a number of qualities not covered by the specifications and suggested that the committee write specifications for top grade cable. Mr. Troop replied that changes which are allowable under the specifications give manufacturers latitude to produce better cable whereas specifications which were too tight restricted their opportunity to improve them. He added that if specific qualities or methods of manufacture are wanted, a railroad may specify them. Chairman Fort said the question would be referred to the Committee of Direction.

C. F. Harvey tells of applications of television to rolling stock.

Application of Radio and Communication Systems to Rolling Stock

The report was presented by C. F. Harvey, diesel engineer, Southern. Specifications for the electrical requirements of radiotelephone transmitting and receiving equipment on locomotives, cabooses and other rolling stock have been worked out jointly by the Electrical Section and the Communications Section, AAR. They have already been approved and included in the Communications Section Manual.

The report also outlines electrical requirements for transmitters and receivers. These include regulation, primary power, duty cycle, deviation factor, power factor, and current requirements.

In the discussion, J. J. Schmidt asked if it was the intention of the committee to eliminate 32-volt power supply for cabooses in its recommendation, and it was explained that the report covers only such equipment as is available for direct application to a specific power source. Thirty-two-volt power is usually used only with a converter, and this type of application is covered in the first part of the report.

W. S. H. Hamilton, now honorary member of the Section, asked when 64-volt equipment had become available, and Mr. Harvey replied that both Westinghouse and Motorola sets which use vibrating inverters were available.

K. H. Gordon, assistant electrical engineer, Pennsylvania, pointed out apparent inconsistencies in wattage and volt-ampere ratings given in the report and Mr. Harvey explained that the values shown include a range from minimum to maximum.

L. E. Grant tells what properly applied sprayed metal will do.

Welding and Cutting

The report of the Committee on Welding and Cutting was presented by L. E. Grant, engineer of tests, Chicago, Milwaukee, St. Paul & Pacific.

Seamless plastic fiberglass helmets and plastic cover lenses for helmets and goggles are described in the first section of the report on welding and cutting. The latter are recommended because they are more resistant to pitting than glass covers and are not easily broken in applying or removing.

Rectifier type welders are described and the report states that the rectifier welder offers some of the advantages of both the transformer and motor generator welding machines. One advantage is the wide current range; other advantages are lack of noise, low no-load power consumption and the use of all three phases of the power lines. Another advantage that may be of special value in some railroad applications is the fact that there is no heavy surge of current in starting up, such as is found with motor generator machines. The machines do, of course, have to be blown out periodically the same as other welding machines to remove dirt and dust that accumulates. One manufacturer has a switch on the machine by which the cooling fan can be reversed to blow the dirt out.

With reference to the use of sprayed metal for building up worn wearing surfaces, the report states that, although some serious failures have occurred, these have evidently been caused by improper procedure, and states that a large railroad is reclaiming diesel-electric locomotive crankshafts using the metal spray process to build up undersize main and connecting rod journal surfaces. A total of 28 reclaimed crankshafts of various makes and sizes are on test in road service. Reports to date indicate a very satisfactory performance; especially on several shafts with one or two reclaimed journals which have been in continuous service for periods of over one year.

Recommended procedure is shown by the series of photographs.

Contact electrodes which have a powdered metal coating are described. The report states that they have recently been improved functionally and that they provide a means of applying weld metal rapidly at some increased cost for electrodes.

Cutting electrodes are also described. These are of two types, both coated, one having a solid core wire and the other a metal tube with a ceramic core. The latter is used under water and both employ very high current values.

The composition and function of electrode coatings of all types are described and are classified in a table.

With reference to welding on diesel locomotives, the report states that certain types of engine heads are not weldable and should be scrapped when repairs become necessary. It is also stated that equalizers which have cracks in them or are worn beyond the limit of wear should not be reclaimed by welding.

The carbon arc-air cutting torch is described as a device which has certain advantages. The carbon arc does the cutting while streams of air through fine orifices blow away the slag and molten metal to produce a smooth groove.

In opening the discussion, Mr. Russell suggested that rectifier-type welders should be equipped with disconnect switches and Mr. Grant replied that the committee does not intend to write specifications for any welding machine.

Mr. Gordon asked if the operation of a thermostat on a rectifier-type welder would affect the quality of the weld and Mr. Grant replied that the current would be reduced to such an extent that no welding could be performed. He added that the capacity of the welder changes almost imperceptibly as the welder heats up. Mr. Gordon also asked the hardness of sprayed metal compared with that of base metals, and Mr. Grant said that sprayed metal may contain different metals and also includes voids so that its hardness cannot be measured by accepted procedures. It does, however, he said, wear exceedingly well, which fact may be due in part to the retention of lubricants by the porosity of the metal. Experience also shows that properly applied sprayed metal will stand much abuse in service.

D. S. Neuhart wants locomotive electrical parts which can withstand water and oil.

Address by D. S. Neuhart

The second-day session of the Electrical Section was opened by an address by D. S. Neuhart, Chairman of the Mechanical Division and general superintendent of motive power and machinery, Union Pacific. In the course of his brief talk, Mr. Neuhart said, "From the one or two headlight electricians, our electrical personnel has grown to become one of the largest and most important segments of our railroad maintenance and engineering organizations. As a specific example, I can state that the electrical maintenance force on the Union Pacific has increased from about 12 per cent to 24 per cent of the total force in a 10-year period.

"The reason for this phenomenal growth is obvious from the most casual observation. In a span of a few short years, new developments in the electrical field have brought a completely new conception of railroading, along with changes in our very way of life. Things which seem to be beyond this realm of possibility today are accepted as commonplace tomorrow."

He also said, "We have an abundance of inventors and gadgeteers who can suggest any number of new devices and additions to equipment. Some of them may be a genuine contribution toward the constant need of betterment at a justified cost. By no means do I wish to discourage such developments. But by the same token we cannot afford the luxury of additions to and complications of apparatus where the function would be served through a simplification of what we have."

Specifically, he urged the electrical men to work toward locomotive electrical equipment which would be impervious to water and oil.

C. R. Wadham describes improved methods of fueling diesels.

Motors and Controls

C. R. Wadham, assistant engineer, Illinois Central, presented the report of the Committee on Motors and Controls. The first section of the report consists of a description of sanding facilities in which photo-electric cells control the operation of a locomotive sanding plant.

Two major developments in motors are described in the second

section of the report. One of these is the introduction of new insulating materials such as Mylar, which has permitted reduction of the size of motors. The other is a 20-hp capacitor-start motor which has a starting current of 190 amp, compared to 400 amp for an ordinary 20-hp single-phase motor, yet has 150 per cent starting torque.

An application of magnetic amplifier control of a battery charger is described in the report of the subcommittee assigned to study this subject. The output d-c voltage is closely regulated with respect to a varying a-c voltage and a rapidly changing load. If the load attempts to exceed a safe limit, the charger converts to a constant-current device.

Under the subject, "Improved Methods of Fueling," a subcommittee describes an automatic diesel fueling system installed by the Central of Georgia, at Columbus, Ga.

Under the subject of electronic track scales, the report describes a proposed scale which incorporates electronic weighing. Such a scale, it is said, would lower pit costs, lower maintenance cost, eliminate platform motion, provide constant sensitivity with various loads, permit multiple remote reading points, and be extremely stable with time temperature humidity and vibration. Most of the initial theoretical work for such a scale has been done.

Discussion initiated by Mr. Schmidt centered largely around the oil fuel pump control system described in the report. It appeared from this that an oil leak would start the pump which would then continue in operation.

C. R. Bland sums up a discussion on water coolers.

Air Conditioning and Refrigeration

C. R. Bland, assistant electrical engineer—rolling stock, Chesapeake & Ohio, presented the Report on Air Conditioning and Refrigeration, assisted by J. L. Christen, supervisor of air conditioning, Pullman Company, W. J. Madden, assistant engineer, Pennsylvania; R. F. Dougherty, general electrical and air conditioning inspector, Union Pacific, and J. J. Schmidt, electrical engineer, Denver & Rio Grande Western.

With relation to temperature and humidity control, the committee reports that the Waukesha Motor Company has discontinued the use of a compressor unloading device in favor of the use of a modulating valve which controls the speed of the driving engine. The Frigidaire Corporation recommends that a device be used to assure 100 per cent loading of the compressor periodically, at intervals of possibly 30 minutes. This prevents certain cylinders being unloaded long enough to cause poor internal lubrication.

Concerning the heating of passenger train cars, the report describes several means developed by the manufacturers to simplify equipment.

Specifications for electric drinking water coolers for diesel-electric and electric locomotives are included in the report.

One part of the report shows that according to the records of one railroad cooling failures of electro-mechanical equipment were due to several causes as follows:

Generators—Batteries	30 per cent
Compressor motors	9 per cent
Condensers	10 per cent
Loss of Freon	9 per cent
Miscellaneous	32 per cent

Another analysis showed that 20 per cent of the total cars operated were responsible for 75 per cent of all failures.

There follow recommendations on how inspection and maintenance should be scheduled. These show how certain items which continuously require maintenance should be considered for change and improvement.

Assignment No. 5 b in the report deals with the analysis of generator and battery capacities and one analysis of this problem is to start with the average electrical load on a hot summer day. With a load factor of 75 per cent and an 8-ton air conditioning load, this will average 12 kw on a coach.

The principal function of the battery is to afford standby protection at low car speeds, and when the car is standing. The battery should have capacity to provide 4 hours' protection in the event of a detention of long duration. This detention may occur when the battery is not fully charged. On this basis, 48 kwhr of energy are required. On a four-hour discharge rate, the battery capacity will be decreased to 85 per cent of its 8-hr rated capacity. Therefore, the required battery capacity will be

$$\frac{4 \times 12}{85\%} = 56.5 \text{ kwhr.}$$

The generator should have sufficient capacity to carry the average car electrical load and charge the battery simultaneously. The time element should be say three hours or the running time of an average division. The battery may be discharged say 50 per cent. The battery efficiency will be approximately 80 per cent. On this basis, the generator capacity can be calculated from the following equation:

12 kw plus (28.3 kw divided by 80 per cent $\times$ 3 hr) = 23.8 kw

The car may be used in interurban service, less than three hours run, with one and one-half hours turn-around time. In this case, there would be less precooling time or battery discharge, perhaps 40 per cent. The equation then becomes:

12 kw plus (22.6 kw divided by 80 per cent $\times$ 3/2 hr) = 30.8 kw

The various methods of testing the effectiveness of air filters are described in the report and the committee is in the process of developing a standard method.

The subcommittee on assignment No. 7 to prepare general specifications for air conditioning existing railroad buildings, or parts thereof, has produced general specifications for window or room-type air-conditioning units, general specifications for self-contained air-conditioning units, and general specifications for central station air-conditioning systems.

The report of a subcommittee assigned to prepare general specifications for types of condensers used on electro-mechanical air-conditioned cars, describes the types used, methods of servicing and cleaning (caustic solutions, acid solutions, and sand blowing) and the economics of the dry and flooded types. The conclusion is drawn that in areas where the sustained ambient temperatures are in excess of 100 deg F and where dust or foreign material is critical, the full-flooded type is most suitable. In all other areas, it is concluded, that the dry type is attractive because of its lower maintenance cost and because the compressor operation will be more reliable than with the spray-evaporative type.

Assignment No. 10 deals with the standardization of plugs and receptacles on mechanically refrigerated cars and it is recommended that all power plugs and receptacles on refrigerator cars equipped with mechanical refrigeration be A.A.R. Standard as shown in Section 3, pages 1-5-1, 1-5-2 and 1-5-3 of the Electrical Section Manual.

Due to space limitation and other conditions, it may be necessary to use fixed receptacles on both the alternator and compressor motor. Where this is necessary, the internal portion of such receptacles should still conform to the A.A.R. Standard and be compatible therewith.

The first part of the discussion was concerned with dirt getting into drinking fountain water when bottles were changed and Mr. Bland agreed that the specifications should include requirements for cleaning. Mr. Madden expressed the opinion that the cleaning is really a part of the regular maintenance program and said that the procedure should be decided by each road.

D. E. Jones, air conditioning engineer, Canadian Pacific, raised the point that the term freon or F12 was too specific, and should be broadened by using an all-inclusive chemical name which would cover all refrigerants of this type.

C. W. Martin expressed the opinion that the specifications for one- and two-cylinder compressors for water coolers should include the sealed type. Mr. Bland said he thought it could be so written.

Mr. Pennell asked how many cars were included in the study covered in the report and Mr. Christen said it was about 1,000.

Concerning air filters, D. Farr, of the Farr Company, was asked what progress was being made toward the standardization of air filtration. He said attempts are being made to obtain agreement, and that Dr. K. Whitney, of the University of Minnesota, is working on this for the American Standards Association. H. E. Donovan, of the Maize Corporation, said he looks to a realistic approach to this problem.

H. C. Cross evaluates various methods of switch heating.

Electric Heating

The Report on Electric Heating was presented by H. C. Cross, electrical engineer, construction, Baltimore & Ohio, assisted by D. M. Burckett, electrical engineer, Boston & Maine; L. B. Curtis, assistant engineer, Pennsylvania, and H. C. Griffith, Jr., General Electric Company.

The first two sections of the report are made up of revised specifications for electric switch heaters. This is a reorganization of Manual material.

With reference to built-in electric heating in platforms, the report states that while it is undoubtedly advantageous in certain applications, that the railroads have few, if any installations. Examples of the use of such heating are given, such as the melting of snow on exposed ramps where industrial trucks must operate. In two of the cases cited a wattage of 40 watts per sq ft is used which is sufficient to melt up to 2 inches of snowfall per hour.

Data on the cost of snow removal has been obtained by means of a questionnaire sent to 52 railroads. Of the 52, 12 replied that climate did not require the use of heaters or they had no information.

From the 40 replies received, the subcommittee has compiled tables and charts showing the data received and the relative economics of snow removal from track switches. From this source of information the committee has developed a comparison of annual recurring expenses for 200-hr use per 1,000 ft of switch length as shown in the table.

	Kerosene pots	Propane gas	Electric
Fixed Charges:			
Interest, depreciation and insurance	$1,060	$8,350	$4,150
Operating Costs:			
Labor, including annual removal	9,410	1,800	..
Supervision, overhead, food, etc.	1,800	200	..
Fuel, including handling and facilities	2,800	2,500	..
Electricity, including demand and energy	..	..	3,068
Maintenance, including overhead	200	3,245	600
Total recurring expense	$15,350	$16,095	$7,818

Tests of switch heaters on the Pennsylvania at Holmesburg, Pa., made during the winter of 1953-54 showed that for the type of service tested, 125 watts per foot was too low a rating for satisfactory performance.

During the course of the discussion, Mr. Cross said he had seen a report prepared by the Central Railroad of New Jersey covering the use of a diesel-electric locomotive for supplying power for switch heating. This may be covered in the 1956 report.

Mr Gordon offered high endorsement of the work done by Mr. Griffith, and Mr. Marras said that such work serves effectively to keep Electrical Section research costs within its budget.

H. P. Wright takes pleasure in presenting the Report on Corrosion.

Corrosion

The Report of the Committee on Corrosion was presented by H. P. Wright, electrical engineer, Baltimore and Ohio. For the benefit of those who need be concerned about buried metals near to each other and connected electrically, the report includes an electromotive series table that indicates which, and relatively how much, one of the metals may be expected to corrode.

The report states that organic protective coatings on buried structures may be used with moderate effectiveness, but that bituminous and thermoplastic coatings do not adhere well are are subject to mechanical damage. Thermosetting resin coatings, it is said are about the best for mechanical stability and satisfactory edherence.

A combination of coatings and cathodic protection is recommended for the interior of steel water storage tanks.

A pad of sand and crushed rock is recommended for use under steel oil storage tanks. The bottom of the tank is shop painted before it is placed on the sand cushion.

An elaborate system of buried metal protection used at the Fairless Works of the U. S. Steel Corporation near Morrisville, Pa., is described for the benefit of those concerned with this subject.

The report was highly complimented by E. G. Gehrke, secretary, Engineering Division, A.A.R.

C. P. Trueax explains the economics of network power distribution.

Power Supply

The Report of the Committee on Power Supply was presented by C. P. Trueax, assistant electrical engineer, Illinois Central, assisted by H. C. Cross, engineer of electrical construction, Baltimore & Ohio. The report outlines the value of networks for power supply systems. Definite economies are shown for such systems, and it is indicated that the usual objection to operating 220-volt motors on 208 volts is not a serious one.

Attention is called to the advantages of HRC (High Rupturing Capacity) fuses to take care of fault currents in excess of those which can be interrupted satisfactorily by a conventional 600-amp cartridge fuse. The HRC fuse uses fine silver links embedded

in chemically inert arc-quenching filler and is bolted directly to the bus bar instead of being installed in fuse clips.

In the discussion, Mr. Fort called attention to the accepted railroad practice of using 220 volts instead of network voltage for a-c motors on air-conditioned cars.

To ease the problem of supplying power to Pullman cars parked for occupancy, Mr. Russell suggested that a number of railroads might establish a pool of material for this purpose which could be moved around as needed. This would require the storing of material and Mr. Dougherty said the leftover material need not be stored since it may be very quickly used for other purposes. Mr. Russell differed with Mr. Dougherty, saying that leftover material was not easily usable, and had to be stored. Mr. Fort said his railroad must provide for three events a year, and that it has been necessary to build up a supply of material which is stored. He said that a power car offers some definite advantages.

J. F. Partridge answers questions on the load testing of engines.

Automotive and Electric Rolling Stock

The Report of the Committee on Automotive and Electric Rolling Stock was presented by J. F. Partridge, assistant engineer, New York Central, and R. P. Turnbull, electrical inspector, Pennsylvania.

A major part of the report of the Committee on Automotive and Electric Rolling Stock consists of a revision of Section G of the Manual in a new Section 7. This deals with methods of testing locomotive performance characteristics.

A subcommittee assigned to study the standardization of diesel electric locomotives has made recommendations covering magnet valves and fractional horsepower motors used on diesel-electric locomotives. It also describes a traction motor disconnect device made by the Torman Company, Chicago, which has turned in a good record of performance over 122,800 miles.

The latter part of the report is a revision of the committee's 1954 report, and deals with ground relay pickup valves, elimination of dust from control equipment, load indicators, and transition indicators, and capacitance bridge type fuel indicators.

In response to a question raised during the discussion, it was explained that the formula given in the report for locomotive power plant output included an efficiency of 93.7 per cent. It was recommended by Mr. Turnbull that the question of what should be expected as engine output be referred to the Mechanical Division for its recommendations.

Mr. Fort told of how overrating reduced the life of pistons to a small fraction of what it was when the locomotive was derated a few per cent.

Mr. Turnbull asked if a 27-point jumper is enough to serve all purposes, and Mr. Martin said that most railroads seem to prefer that alarm circuits be not trainlined. Mr. Fort added that he agreed generally with Mr. Martin, but that on the Illinois Central, they had returned the hot-engine alarm to the trainline. In the case of unused trainlines, Mr. Martin said it is better to have the wire terminated at a convenient place than to carry it into the receptacle contact.

Relations With Public Utilities

The report on Relations With Public Utilities was presented by K. H. Gordon, assistant engineer, Pennsylvania, and E. H. Anson, Sr., Vice President, Gibbs & Hill, Inc.

The first part of the report on relations with public utilities consists of data presented to show the phenomenal growth of the power industry in the United States.

The latter part of the report is concerned with the relative cost of transmitting electric energy versus transporting fuel. Two recent papers on the subject are quoted. One author concludes as follows:

1. Although coal will continue to be the principal source of energy, long distance transmission can be justified economically only on the basis of large capacity generating stations located practically at mine mouth with an assured supply of low cost fuel.

2. Transportation industries must be in a position to meet the competition of long distance transmission, as transmission investment assures a long time fixed rate for transporting energy.

The other author sums up his findings with the following:

1. Although it is not possible to present a generally applicable formula for the cost of transmitting energy, it is not difficult for the competent engineer to prepare a reasonably accurate estimate, once the conditions are known for a particular case. Each case must be the subject of a separate study.

2. In relatively few cases, under present conditions, can long distance transmission, even at very high voltage, be justified on the basis of competition with coal transported by rail.

3. The larger the concentration of generating capacity in a power plant and the better the load factor, the longer the distance at which power can be transmitted economically.

4. The higher the efficiency of the power plant and the better the grade of coal available, the shorter the distance at which power can be transmitted economically.

5. During the early stages of periods of rising prices, transmission line construction is more attractive to the power companies as they can thus be assured of a long term, relatively constant rate for transporting energy.

6. The railroads should keep themselves alert to the problem in order to exert every effort to maintain a favorable competitive situation.

L. B. Curtis sees brighter future for railway electrification.

Railway Electrification

The several sections of the Report on Railway Electrification were presented by L. B. Curtis, assistant engineer, Office of Electrical Engineer, Pennsylvania, B. C. Hallowell, engineer of transmission and electric traction, Long Island, L. W. Birch, transportation department, Ohio Brass Company, and H. F. Brown, Gibbs & Hill, Inc.

The report is opened with the following statement:

Committee 13 has taken a positive and active approach to the general subject of railroad electrification. The work was not limited to the recording of statistics and the history of a dying mode of transportation. Rather we have seen possibilities in the future of further electrification in this country and are endeavoring to discover improvements in the art, and to facilitate for management ways and means to compare and study electrification versus other means of motive power.

Detailed technical sections of the report deal with trolley wire height (19 ft is recommended where men are not permitted on tops of cars), specifications for bronze and copper trolley wire, lubrication of trolley wire, trolley wire wear, and failure and track and third rail bonds.

Under the subject of development in the field of railway electrification, the report includes ignitron cars and locomotives on the New Haven, 180 miles of 3,000-volt d-c electrification in Belgium, a 3-year program for 15-kv low-frequency electrification

in the Ruhr district of Germany, plans for India, the extension of the 22-kv, 50-cycle of the Bas-Congo-Katanga Railway in Africa and the work being done on 25-kv, 50-cycle electrification by the French National Railways.

Methods of making electrification studies have been worked out in considerable detail and included in the report.

A questionnaire was sent out last year for the purpose of developing an annual report on pertinent physical, operating and economic statistics on railroad electrification systems. Returns have now been tabulated for the principal railroads in the United States and are included in the report. This information is new and contains valuable data not heretofore published.

Discussion raised the question of the 19-ft height of contact wire mentioned in the report. It was explained that this is adequate for application where men are not allowed on tops of cars, that it permitted a considerable reduction in the cost of the contact system, and that it made for better performance of pantographs.

In presenting his section of the report, Mr. Birch read a number of excerpts from current articles and talks bearing out the contention that electrification will regain favor in railroad operation.

Mr. Brown voiced objection to the manner in which diesel and electric locomotives are compared in the report. He also said that the objections to the unbalancing of phases raised in the report are greatly overdrawn.

Mr. S. V. Smith, assistant electrical engineer, Pennsylvania, called attention to the fact that m-g sets have not been included in the report and said that information is needed concerning their potentials when used on a 60-cycle system. He also said that more information is needed on the cost of 60-cycle systems.

S. B. Pennell conducts discussion of the car electrical equipment report.

Car Electrical Equipment

The Report of the Committee on Car Electrical Equipment was presented by S. B. Pennell, assistant engineer, New York Central, and S. V. Smith, assistant electrical engineer, Pennsylvania, and T. G. Isel, assistant car equipment engineer, Pullman Company.

The first 60 pages of the Report on Car Electrical Equipment consist of a very thorough revision of those sections of the manual which deal with storage batteries, axle generator equipment, car electrical distribution systems and train lines.

Subcommittee No. 1 was given an assignment to develop a standard battery terminal bolt size and has recommended that "Battery terminal bolts shall be $\frac{5}{16}$ in. in diameter, with 18 threads to the inch." No length is specified since battery terminals are of varying thickness.

Concerning diesel engine-driven generator sets, the report calls attention to the use of relatively large, slow-speed units which have been installed in the body of full dome cars which take revenue space, but which offer the advantages of longer life and greater reliability.

The report states that the trend in axle-driven equipment for caboose power supply seems to be toward the alternator-rectifier type, and 12 volts seems to be most favored. This axle-driven equipment, the report states, requires much less maintenance than the engine-driven equipment, and is of 1.0 to 1.5-kw capacity. It adds, however, that where larger amounts of power are required (upwards of 2.5 kw) the engine-driven generator has an advantage and a smaller storage battery may be used.

There are at the present time, 24,168 cabooses owned by American and Canadian railroads, 2,398 of which have been equipped with electric power. Of these, 90 per cent employ axle-driven generators and 7 per cent are equipped with diesel or propane engine-driven generators. There are a few with other sources of power including primary batteries. Generator voltage is 12-15 d-c on 65 per cent of the installations and the next most popular voltage is 28-35, which totals 20 per cent. Power at 110-120 volts d-c is used in 7 per cent of the installations. Generator ratings from 0.86 to 1.5 kw include 73 per cent of the total. The capacity of batteries in 82 per cent of the applications ranges from 150 to 300 amp-hr.

Different types of ground detection methods are discussed in some detail. They include flashing (which consists of placing a pair of pliers between a battery lead and a grounded bolt), the single- and two-lamp methods, the differential relay method, and the use of the vibrator-type ground detector. The report states that there is no one instrument now available that will satisfactorily meet all conditions and recommends that the assignment be continued.

The committee, in investigating methods for testing Spicer drives and clutches, has developed recommended procedure for checking and overhauling drives which have been in service. The illustrations show a drive used to test overhauled units. It consists principally of a wheeled, holding fixture having a quick clamping arrangement and a 10-hp variable-speed drive with connecting shaft and companion flange. There is also provision for a pony brake to load the unit and prevent backlock. Take-off shaft speeds can be varied between 600 and 1,800 rpm. During a test, the unit is run at 600 rpm for 30 minutes in each direction, then at 1,000, 1,200, 1,400 and 1,800 rpm for one hour at each speed; 30 minutes in each direction.

The final section of the report summarizes the preference of railroad men for voltages to be used respectively, with axle-generator systems and individual undercar power plants. The replies to a questionnaire showed that for axle systems, 8,901, or 22.77 per cent, preferred 32 volts d-c; 16,456, or 42.09 per cent, favored 64 volts d-c; and 13,734, or 35.14 per cent, considered 110 volts d-c to be the best choice.

Inasmuch as there is a plurality, for 64 volts, the committee submits that this plurality be accepted as the best indication of opinion that can be obtained at this time.

The results for undercar power plants were as follows:

32 volts d-c . . .	4,147 volts . . .	10.6 per cent
64 volts d-c . . .	2,343 volts . . .	6.0 per cent
220 volts a-c . . .	32,421 volts . . .	83.4 per cent

In view of the majority for 220 volts a-c for individual power plants, it is recommended that this voltage be adopted as standard for future passenger cars.

A considerable amount of discussion was given to the required length of jumper cables for use between cars. It was summed up by Mr. Fort who said that specifications had better be kept simple so that new types of train lines may be taken care of as the need develops. The increasing importance of ground measurements on passenger cars was discussed in detail and Mr. Schmidt said his road (D. & R. G. W.) will either equip its cars with permanent ground detectors or will supply electricians with meters.

D. F. Dunsmore summarizes current practice on cleaning of electrical parts.

Repair Shops

The report was presented by D. F. Dunsmore, electrical engineer, Chesapeake & Ohio. Concerning shop procedures, the report states that after studying the question of the types of intervals

used in scheduling inspections, maintenance and repairs; it was the consensus of opinion of the subcommittee that time or calendar period intervals for scheduling of inspection, maintenance and repairs have many advantages over fuel consumption, mileage or other intervals; particularly when a large number of locomotive units, operating under similar conditions is involved.

There then follows a detailed discussion of all the factors involved to show why this conclusion is reached.

Supplementing its 1953 report, the subcommittee on repair facilities outlines the type of shop facilities required by railroads operating respectively 10 or less, or 20 or less, locomotive units.

Tentative estimates of the costs are given in the two tables.

SHOP FACILITIES FOR TEN OR LESS LOCOMOTIVES

Building: 50 ft wide by 110 ft long by 30 ft high, with one inspection pit.	
Construction: steel frame, brick curtain walls, corrugated wire glass, corrugated asbestos siding, and rolling steel doors.	
Price: includes trackwork inside building, drainage and painting	$ 75,000
20-ton overhead floor operated crane	25,000
Heating in building	5,500
Plumbing	3,000
Electric lighting and power wiring in building	10,000
Roof ventilators	2,000
Office furniture, shelving, lockers, etc.	2,100
Lube oil storage and piping system	3,500
Compressed air piping in building	900
Total cost	$127,000

SHOP FACILITIES FOR TEN TO TWENTY LOCOMOTIVES

Building: 90 ft wide by 140 ft long by 30 ft high, with two inspection pits.	
Construction: Same as for the single track building	$171,100
30-ton overhead floor-operated crane	30,000
Heating in building	7,000
Plumbing	3,000
Electric lighting and power wiring	18,000
Roof ventilators	3,600
Office furniture, shelving, lockers, etc.	3,600
Lube oil storage and piping system	4,500
Compressed air piping	1,200
Total cost	$243,000

Note: The above estimates do not include any facilities outside the building proper, and are subject to possible reductions, depending on type of construction and related shop facilities.

A list of the tools required is also included.

Facilities for layover and care of diesel locomotives at outlying points are discussed and listed in detail.

The subject of high potential d-c testing has been given extensive study, which is outlined in the report. Two important conclusions are drawn. One is that tests have definitely indicated basic advantages of d-c over a-c testing. The other is that d-c overpotential testing should be employed not only to check whether the equipment is good, but to indicate how good, and how much longer the machine or equipment can be expected to operate without failure.

For electrical testing other than high potential, the report describes a device, with 52 contacts, which connects a voltmeter by means of many wires to various points on the locomotive. It is said that it works very fast and well for single defects, but may not do so well in the case of interlocking related circuits. The suggestion is made, that it is particularly well suited for places where personnel is not too well acquainted with circuit tracing.

Circuits for testing jumper cables are shown in two charts.

The advantages and disadvantages of degreasers are listed. In this discussion, the need for timing the degreaser action is emphasized. It is also pointed out that newly developed varnishes are not nearly as susceptible to being dissolved by the degreaser solvents as are older varnishes. It is the opinion of the committee that the advantages at present favor the degreaser.

Specifications and procedures are also included for electrical parts solvent cleaners, mechanical parts cleaners, locomotive interior and exterior cleaners, and cleaners for brush holders, contactors, reversers, cam switches and other electrical parts.

A complete and detailed outline for servicing of diesel locomotive traction motors removed from the trucks as practiced by a few railroads included in the report in tabular form. It is offered as information only and not as recommended practice.

During the discussion, T. G. Isel, Pullman Company, said it is his understanding the d-c high-voltage testing is predicated on keeping records of insulation values to establish a history of a unit in service, and asked if it is possible to keep such a record. Mr. Fort replied that d-c testing has stemmed from its use on large machinery under circumstances in which the keeping of records is relatively easy. The interpretation of such records, he said, requires more knowledge of insulation than is yet available.

Mr. Gordon asked if d-c testing might be successfully used on transformers in which failures often occur between turns. Mr. Dunsmore replied that such applications will be considered in next year's report.

Asked by Mr. Gordon if rules covering high-potential testing included d-c, Mr. Fort replied that there is nothing in the requirements that prohibits the use of d-c. The equipment required, he said, is cheaper and easier to handle, and he has heard no objections to its use.

The section of the report on cleaning materials and methods was presented by H. M. Epps, mechanical inspector, Texas & Pacific. Asked by Mr. Russell why both perchlorethylene and trichlorethylene were recommended for degreasers, Mr. Epps replied that their use depends upon the type of material to be cleaned. For electrical parts, he said perchlorethylene is recommended. J. A. Chisholm, general inspector diesel equipment, Canadian Pacific, asked if these materials were suitable for spray cleaning, and P. G. Sasgen, system diesel supervisor, Pennsylvania, replied that they were recommended only as degreasers. J. O. Fraker, superintendent diesel and electrical maintenance, Texas & Pacific, said he had used both types of cleaners, and is of the opinion that perchlorethylene is generally to be preferred. The choice, he said, is largely dependent on the characteristics of the machining used for cleaning.

C. A. Williamson, electrical engineer, Texas and New Orleans, asked about the effect of ambient temperatures, and Mr. Chisholm replied that they are an important factor in the selection of cleaning agents.

E. J. Feasey is honored for his work with the Wiring Diagrams Committee.

Wiring Diagrams

E. J. Feasey, general supervisor diesel equipment, Canadian National, presented the Report of the Committee on Wiring Diagrams. The committee continues effectively to carry out its work on the standardization of wiring diagrams. It has prepared a table of contents for reorganizing Section H of the Manual into a new Section 18. Specific recommendations in this year's report concern wire markings for schematic and connection diagrams.

Because of the pressure of other duties, Mr. Feasey had been

obliged to relinquish the chairmanship of this committee, and the work has been assigned to C. W. Martin, assistant engineer—diesel-electric, Baltimore and Ohio. Discussion was concerned largely with the number of wires—namely, 60—recommended for use in train lines. Situations were cited where more wires might be required, but it was the consensus of opinion that the committee's recommendations were adequate for all normal requirements.

G. L. Sealey describes new lighting developments.

Illumination

The Report of the Committee on Illumination was presented by G. L. Sealey, assistant engineer, Reading Company, and J. L. Swarner, electrical engineer, Pullman Standard Car Manufacturing Company.

A major part of the work done by the committee consists of revising and reorganizing several parts of the Manual which have to do with lighting into a new Section 5 of the Manual. This now includes a glossary of illumination terms—the lighting of passenger train cars, suggested maintained footcandle values, the lighting requirements of various types of cars, maintenance factors affecting efficient illumination, electric lamp characteristics, selection of fluorescent lamps and evaluation measurements and tests.

A section of the report devoted to developments in electric lighting of interest in the railroad field includes characteristics of a high output rapid-start fluorescent lamp, a 200-watt PAR-46 flood lamp and new infrared lamps. Included also are notes on the value of ventilated fixtures which are self-cleaning and which operate at reduced temperatures.

Headlight pickup tests made at Harmon, N. Y., in 1952 are described. From these tests, it is believed that it can be concluded without question that the 200-watt, 30-volt, PAR-56 headlamps, operated at 30 volts, can definitely be relied upon to give the 800-ft pickup required by the ICC Rule 231 (a) with considerable margin to spare.

Types of lighting for various servicing and major overhaul shop facilities are recommended in the report of a subcommittee assigned to compare different types of lighting.

The same subcommittee offers a report on the location of fuel oil leaks on diesel engines by "black light." Fuel oil and lubricating oil used in diesel engines each have a characteristic natural fluorescence under ultra-violet or "black" light. Lubricating oil generally fluoresces an opaque milky-white. Fuel oil, on the other hand, is generally milky blue. Whenever fuel oil is present in lubricating oil, the milky white background of the lubricating oil becomes milky bluish purple. By tracing back this bluish purple color to its origin, using the ultra-violet light, the exact area of the leak can be determined.

Also included in this section of the report are descriptions of lighting in the New York Central's Collinwood Shops in Cleveland, Ohio; the floodlighting of the Illinois Central's Markham Hump Yard in Chicago; the lighting of the Pennsylvania's Ticket Office in Pittsburgh, Pa.; and floodlighting for railroad yard-television. Accompanying illustrations show the lighting in several parts of the Collinwood shop.

A drawing is included in the report to show the location of lighting units in the Illinois Central's Markham Yard. It is an automatic retarder yard, including 64 classification tracks. The area of the yard is 1,877,500 sq ft, and the illumination is approximately .1685 lumens per sq ft on a horizontal plane.

The new ticket office at Pennsylvania Station, Pittsburgh, Pa., incorporates a modern system of passenger ticket and Pullman reservation service. In addition to the general working area, there are several small offices for the convenience of passengers requiring special attention. Maximum utilization of this system requires high-level illumination.

A fiberglass ceiling for sound absorption was suspended 11 ft high with recessed incandescent and fluorescent lighting fixtures. The fluorescent troffer fixtures are 2 ft wide and 4 ft long, for use with 40-watt, T-12 bulb, rapid-start type lamps, and of such a design that either 2, 3 or 4 lamps can be used. These units are enclosed by sections of two-ft sq molded plastic. The recessed incandescent fixtures use 100-watt lamps and are shielded by concentric metal louvers.

The general working area and the small offices are illuminated by the fluorescent fixtures.

Where television is used in classification yards, a method of illumination is needed for lighting cars to check car numbers. This is done in one case by two banks of 150-watt projector lamps with each of two television cameras. A total of 60 lamps are used.

The subcommittee reporting on standard lamps for locomotive and car lighting sent out a questionnaire to determine the amount of application of all types of lamps in this service, and as a result the committee recommends that five types of lamps be deleted from the list.

On the subject of illumination of passenger station platforms, the report offers the following information.

In line with overall improvements in the downtown area of the city of Pittsburgh, Pa., the Pennsylvania is modernizing its Pennsylvania station.

New station facilities, modern train and umbrella sheds, with low level platforms, have been constructed. There are 8 platforms, each about 18 ft wide and from 900 to 1,300 ft long.

These platforms are illuminated by incandescent lamps, 150-watt, R-40 reflector bulb, flood type, encased in a spun aluminum housing. This canopy protects the bulb from moisture and shields the light source at a 15-deg cutoff angle. A shock absorbing socket is used to reduce lamp failure from filament breakage to a minimum.

Lamps are mounted on 15-ft centers in 2 rows, 18 ft above and 2 ft from the edge of the platform. They are suspended at an angle of 10 deg with the vertical and point toward the center of the platform. This arrangement gives an average intensity of 8 footcandles.

The area between tracks contains locomotive and passenger car servicing facilities. The lighting of this section is accomplished by using fixtures similar to the 150-watt platform type, except with 31-deg cutoff angle. They are mounted 11 ft high on each side of structural steel columns which are spaced on 30-ft centers. There is sufficient illumination in the working area for efficient use of these facilities.

The platforms were placed in service in the fall of 1953. There has been a simplicity of maintenance in that no cleaning has been required and lamps can be easily replaced with a lamp stick.

In the course of the discussion, Mr. Swarner said that if fluorescent lamps of different characteristics are used together it makes a bad appearance. He also recommended the replacement of lamps at regular specified intervals since the cost of replacing a lamp is greater than the cost of the lamp.

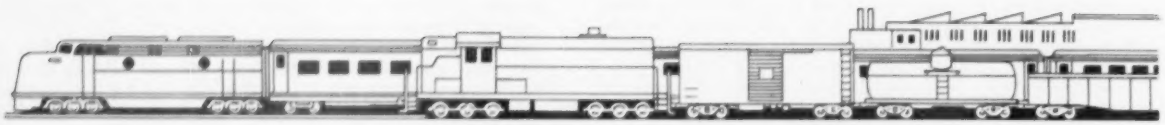
R. L. Henderson, General Electric Company, was called upon to answer a number of questions. Among his answers were statements that germicidal lamps are the most efficient source of energy used for producing fluorescent light, and that as germicidal lamps they must not be placed where they may be seen directly. He said that the output of regular fluorescent lamps is not affected by temperatures above 60 deg F and that special lamps are available for use at lower temperatures. Such lamps, he said, are in use for yard lighting.

Mr. Fort asked if the term Luminaire is to supplant the word "fixture" and Mr. Swarner replied that the new term had now been adopted by the Illuminating Engineering Society.

Fluorescent lamps having a warm color were seid to be preferable for places used for passengers. It was said they show dirt more readily than the daylight type and to take care of this, more cleaning and ventilated fixtures which do not accumulate dust rapidly, were suggested.

The use of black light for detecting fuel oil in lubricating oil was discussed and Mr. Martin told of an additive which can be added to the oil to make the use of the light more effective.

?????



● **THIS IS A BRAND NEW DEPARTMENT** which we hope will develop into a "round table" or "forum" where you, our reader, can put up your problems for discussion and say what you think about the other fellow's questions and answers. This will be a place for you to "hash over" maintenance and design problems that concern cars and locomotives and their mechanical and electrical features.

● **THIS MONTH'S BIGGEST PROBLEM** is to get a name for the "new baby." A staff meeting came up with two suggestions—"LOCAR'S LOWDOWN" and "WHO'S GOT AN ANSWER." Maybe you have a better one. We are willing to pay $25.00 for a name that will really identify this page. Let's have your suggestions. Use the coupon below for submitting them.

As a starter, here's one question that has come up frequently. We threw in all our answers just for a sample. If you have any additional thoughts on this, let's hear from you. Your answer will be treated as a separate item and will be credited to you, as you prefer.

Q—Is there a solution to the problem of flat spots that develop on the wheels of diesel switchers?

A—Diesel switchers have frequently replaced much heavier steam switchers that had the advantage of additional braking power on the wheels of the tender. In handling heavy cuts of cars or working on grades, wheels will lock and slide during braking. Tests have shown that weight transfer can unload the trailing wheels of each truck and cause them to slide while the front wheels continue to roll against the brake shoes. Railroads have attempted many solutions for this troublesome problem.

Probably most widely used is the lowering of the reducing valve setting so that instead of 45 psi, the independent air pressure cannot exceed 40 psi, or even 30 psi. Some roads have replaced the original brake cylinders with smaller ones to reduce the braking power of the locomotive. While training of enginemen can help some, the handling of an unusually heavy cut of cars or poor rail conditions can still result in sliding wheels.

Some work has been done with devices such as the Decelostat for detecting these sliding wheels. Most flat spots are developed in a very short time, and the speed differential between the sliding wheel and one moving at a very slow speed is so slight that these devices have not been too effective. Some lines have operated braking cars which are old steam tenders cut down and ballasted with scrap and concrete. These cars have been fitted with headlights and sanders. The braking power developed on these 87-ton units has speeded yard operations because a single locomotive working with one of them can stop in a much shorter distance and much more rapidly without locking its wheels. Grease on track can not only cause a locomotive to slip when power is applied, but also will cause it to slide when the brakes are applied. One line even discovered that the use of grease heavier than recommended in the traction motor gear case was the cause of flat spots developed on diesel switchers.

Good questions and good discussions are worth money to you. Railway Locomotives & Cars will pay $5.00 for questions that are accepted, and any discussion we publish will pay you our regular space rates (with a minimum payment of five dollers).

To get the show on the road, here are several questions:

Q—Have any special tools been developed for installing the newly-developed journal lubricating devices, can the regular packing hook be of any use, or is this strictly a hand operation?

Q—During the rebuilding of older diesel units, is the most economical solution complete rewiring? When it is used, is this the thing that keeps the unit in the shop the longest, and if it is, how can this time be reduced?

Q—For ordinary heavy freight car repairs does it save time and money to assemble car sides or sections of car sides in a jig prior to their application to the car?

If you have any ideas on any of these we want you to tell us what you have found or developed. We would like to identify you with your answer by giving your railroad and title. However we can leave this out if that is the way you want it.

Q & A EDITOR
Railway Locomotives & Cars
30 Church St
New York 7 N. Y.

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Questions and Answers

General Motors
Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G296-Q—How are the relays operated?
A—The FTM and FTP are voltage operated relays whereas the BTP is a current operated device.

Load Regulator

G297-Q—What is the load regulator and how is it connected?
A—The load regulator is an automatically operated rheostat connected in series with the battery field of the main generator.

G298-Q—How does it operate?
A—Engine oil pressure is used to force the rheostat to vary its position as directed by a pilot valve in the engine governor, loading the engine according to the throttle setting in the cab.

(Manual 2310, pages 308, 309)

G299-Q—What components does the load regulator have?
A—The load regulator has two components: (1) the pilot valve in the engine governor, and (2) a self-contained unit consisting of an hydraulic vane type motor attached to the commutator type rheostat.

G300-Q—What are the external wiring connections?
A—The only external wiring connections are two leads to the battery field circuit.

Battery Field Contactor and Fuse

(Manual 2310, page 309)

G301-Q—How does this contactor function when the throttle is moved to Run 1?
A—Closes and connects low voltage to the main generator battery field.

G302-Q—How does it function during transition 2-3 or 3-2?
A—The contactor momentarily opens, reducing generator output.

G303-Q—How does the battery field contactor function during dynamic braking?
A—Closes when transition lever is placed in "B" position.

G304-Q—What takes care of the high voltage induced in the battery field when the battery field (BF) contactor is opened?
A—A selenium rectifier and discharge resistor are used to dissipate the high voltage so induced.

G305-Q—What fuse is used and where is it located?
A—An 80 ampere battery field fuse, located in the low voltage panel, protects the battery field circuit.

G306-Q—What are the results if this fuse is blown?
A—The unit will not develop normal power.

Main Battery Switch

(Manual 2310, page 311)

G307-Q—Where is the main battery switch located?
A—On the distribution panel.

G308-Q—What does it connect?
A—This switch connects the 32 cell, 64 volt, 426 ampere hour capacity (8 hour rating) battery to the low voltage circuits.

G309-Q—Where is the connection for charging the battery externally?
A—An external charging receptacle is located on the left side of the locomotive.

Battery Ammeter

G310-Q—Where is this ammeter located and what is its function?
A—The battery ammeter is visible through an opening on the front side of the electrical cabinet and shows whether the battery is charging or discharging.

G311-Q—Normally, what does the meter indicate?
A—Zero, or a slight charge.

G312-Q—What must be done if a continual discharge is shown?
A—The auxiliary generator output should be checked, or the battery may run down.

Reverse Current Relay (RCR)

G313-Q—Where is this relay located and what does it control?
A—Located on the low voltage panel, this relay controls the opening and closing of the battery charging contactor (BC).

G314-Q—When does the Reverse Current Relay cause the battery charging contactor to open?
A—When the auxiliary generator voltage drops below that of the battery.

G315-Q—What action is thus prevented?
A—A reverse flow of current from the battery, attempting to "motor" the auxiliary generator.

Battery Charging Contactor (BC)

G316-Q—Describe this contactor and its function.
A—This contactor is an electrically operated switch, connecting the auxiliary generator output to the low voltage system. As stated previously, the reverse current relay controls the operation of the battery charging contactor.

Battery Charging Fuse

G317-Q—What is the purpose of this fuse?
A—To protect the auxiliary generator against any possible overload.

Diesel fuel additive

to relieve filter-plugging and injector-sticking problems

In an effort to reduce operating costs, the railroads have recently done considerable work with catalytic-cracked and blends of cat-cracked and straight-run diesel fuels.

Engine performance problems

With the cooperation of the refiners, much progress has been made by the railroads in the efficient use of these fuels. However, there are a number of problems inherent in such a change of fuels—some of them having a direct bearing on the performance of diesel engines.

Filter-plugging—which is likely to result in injector-sticking—has been one of these problems.

To solve it, many refiners are now using a Du Pont additive, FOA-2, to stabilize cracked distillates and overcome incompatibility between blends of cracked and straight-run stocks. Many of the leading railroads are reporting excellent results with No. 2 fuel oils containing FOA-2.

Good filterability

Du Pont FOA-2 is a dispersant as well as a stabilizer. And because of its excellent dispersant action, it improves the filterability of diesel fuels. In this way, it helps to *eliminate most injector-sticking and filter-plugging problems.*

In addition, being an ashless, nonmetallic additive, Du Pont FOA-2 does not contribute to the exhaust stack sparking problem. It is economical, too, since it is effective in low concentrations.

Developing new additives for improved fuel and lubricant performance is a continuing project of the Du Pont Petroleum Laboratory. For more complete information on Du Pont FOA-2 and other new Du Pont additives, address your request to any of our regional offices listed below.

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B1042-2 (illustrated above)	300	64 DC	12 DC	2650	radio equipped diesel locomotives
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B1042	300	64 DC	32 DC	2200	cab signaling and train control
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314131	300	64 DC	115 AC	1800	radio equipped diesel locomotives, requiring 115 volts AC, 60 cycle, single phase power
B1249	225	64 DC	32 and 350 DC	2400	for dual voltage requirements for cab signaling and train control

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Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F270-Q—What is the air pressure to the thermostat and how is it indicated?
A—Seventeen pounds and it is indicated by an air gage below the upper cabinet.

F271-Q—What regulates this pressure?
A—A reducing valve in the line, connected to the main reservoir.

F272-Q—What protective devices are installed?
A—A relief valve set at 19 pounds to protect the temperature control and a drip well and filter is installed ahead of the pressure regulator.

Operation of Temperature Control System

(Bulletin 1706—118-A, page 3)

F273-Q—How are the cooling system controls arranged?
A—The cooling system controls are arranged to provide automatic control of radiator shutters and cooling fans to maintain the desired water temperature.

F274-Q—What air pressure leaves the thermostat with a cold engine?
A—O psi.

F275-Q—How is the thermostat set?
A—The thermostat, which is mounted with its temperature sensitive element in the cooling water line, is set to increase the air pressure to the step controller as the temperature of the cooling water increases.

F276-Q—What happens as the water temperature rises above the temperature that the thermostat is set at?
A—The air pressure to the step controller gradually increases from 0 to 17 psi.

F277-Q—What action takes place when the air pressure reaches 4 psi?
A—Switch No. 1 of the step controller closes an electrical circuit to energize a solenoid valve which opens the shutters.

F278-Q—What takes place when the air pressure increases to 6 pounds?
A—The contacts of step controller cam-closed switch No. 2 close and the No. 1 fan starts.

F279-Q—When does fan No. 2 start operating?
A—When the air pressure rises to 8 pounds and closes step controller switch No. 3.

F280-Q—When does the No. 3 fan start to operate?
A—When the air pressure rises to 11 pounds and closes step controller switch No. 4.

F281-Q—When does the No. 4 fan start operating?
A—When the air pressure rises to 14 pounds and closes step controller switch No. 5.

F282-Q—How long do the fans continue to operate?
A—As long as the temperature of the cooling water is above the setting of the thermostat. The fans stop operating in reverse order as the temperature drops and finally the shutters close.

F283-Q—Do all the units have this arrangement?
A—No. The 1,600 hp units use only 3 fans, 3 contactors and 4 controller contacts.

Hot Engine Alarm Switch

F284-Q—Where is the hot engine alarm switch located and how is it connected?
A—On the engine water outlet manifold and is directly connected to a water thermal switch.

F285-Q—How does this switch function?
A—If the water outlet temperature exceeds 195 degrees F the switch closes to light the hot engine alarm light (only on unit affected) and ring the alarm bells on all units.

F286-Q—What must be done if alarm comes on?
A—Check for cause and take the engine off the line if necessary.

(Bulletin 1706—118-A, page 4)

F287-Q—Name some of the causes.
A—1. Steam valves open into engine water system or cab heaters; 2. Shutters stuck or closed; 3. Dirty magnet valve; 4. Shut-off cock closed; 5. Fans not running.

F288-Q—In case the fans are not running, what would you look for?
A—Leakage in 17 lb control air lines; defective step controller or a defective thermostat.

F289-Q—What can be done to check for defective step controller?
A—If necessary, rotate by hand to limit of travel so that all contacts are closed.

F290-Q—Name some other causes for hot engine alarm.
A—Water low; defective water pump; restricted water circulation or scale deposits in water system causing poor heat transfer.

Filling Cooling System

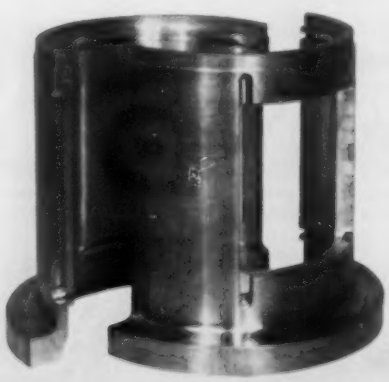
F291-Q—What is the design of the water level?
A—The water level is designed to be below radiators when the engine is shut down, with the same level maintained winter or summer.

F292-Q—What is used to indicate water level?
A—Two 16 in. overlapping sight glasses on the engine water tank indicate water level.

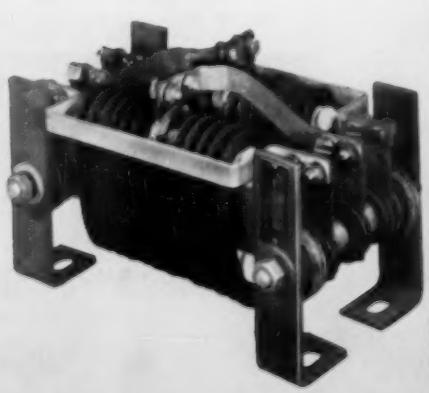
F293-Q—What indicates minimum level?
A—A low level red line indicates minimum level on the lower sight glass, and no engine should ever be operated with water below this mark.

2 G-E RECOMMENDED CARBON BRUSHES are selected for the proper degree of hardness and grain structure to minimize wear and provide correct commutation.

3 G-E MOTOR SUSPENSION BEARINGS give long life—have an oil-return feature which can save up to $85.00 per locomotive unit annually.



4 G-E RESISTORS have floating steel backbones that expand and contract freely with high-temperature changes and therefore are not affected by buckling forces.



7 G-E replacement parts for better locomotive operation

1 **LONG-LASTING COILS with new mica mat insulation are assured by a special manufacturing process developed by General Electric. Continuous research during more than 50 years of locomotive manufacture makes G-E renewal parts your best buy.**

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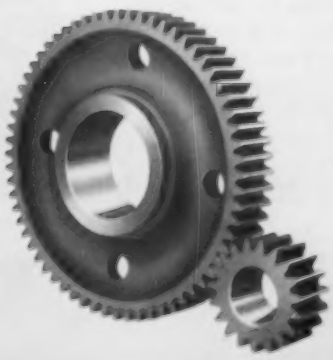
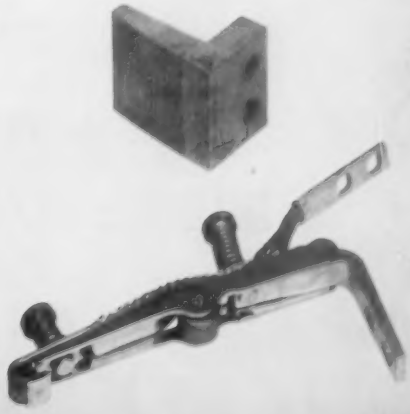
6 **G-E GEARING is designed and quality-control manufactured to carry the heavy starting loads and take the running shock loads encountered in today's railroad service.**



7 **G-E CONTACT PARTS break circuits quickly with a minimum metal transfer—assuring long service life.**



MET-L-WOOD
METAL BONDED TO PLYWOOD

DOORS

★ LIGHT... TOUGH... DURABLE
★ NO THROUGH-BOLTS
NO WARPING
★ NO TWISTING
NO SWELLING

BAGGAGE AND POSTAL CAR DOORS

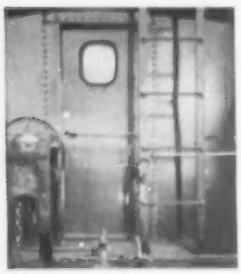
Completely weatherproof Met-L-Wood doors effectively prevent internal rust and rot... and their tough, smooth surfaces stay new-looking for years. Stainless steel channels along bottom edges of sliding doors are rustproof...virtually wearproof. All-rubber window sash installed or removed in minutes... rattle-proof... water- and weatherproof. Available in full width and split types ... sizes to meet all needs.

Exclusive Split Door Seal

Drawing above shows simple Met-L-Wood Split Door Seal which assures weather- and watertightness for years of continual use. Seal also provides effective cushion when closing split doors.

PASSENGER CAR END, VESTIBULE, INTERIOR DOORS

Sound-deadening, insulating, vibration-damping Met-L-Wood doors for passenger cars add to service life, cut deadweight . . . Combine modern, clean-line beauty with great strength and durability. Furnished for manual or automatic operation, with or without hardware assembly. Tapping plates for hardware are built into doors . . . invisible additions to strength and trouble-free service life. Sizes and types to fit all requirements . . . exact dimensions insure quick assembly and perfect fit. Door thicknesses from ½" up, as required.



CABOOSE DOORS

Met-L-Wood caboose doors are built to last the life of the caboose—and to give trouble-free service the whole time. Weather-proof, warp-proof, rot-proof doors can be provided with or without stationary windows in all-rubber sash or with standard drop sash. Available with or without hardware. In all sizes to exactly meet specifications.

DIESEL LOCOMOTIVE DOORS

Widely used by builders on new locomotives, Met-L-Wood doors guarantee trouble-free operation of end and interior doors on diesel road locomotives and cab doors for diesel switchers. Furnished to exact dimensions, with or without windows; either with hardware installed, or with tapping plates placed for hardware assembly on the job.

Write for this Bulletin

Met-L-Wood Bulletin 520 gives the complete, illustrated story on Met-L-Wood doors for railroad uses ... shows construction details, describes standard and special types and sizes. Your copy sent free upon request—write for it today.

MET-L-WOOD
CORPORATION

6755 W. 65th Street
Chicago 38, Illinois

MET-L-WOOD • *STRONG... LIGHT... Smooth Finish... Sound Deadening... Fire-Resisting... Insulating*

SYMBOL of WESTERN PROGRESS...

1855 SOUTHERN PACIFIC LINES 1955

During the past 100 years, the Southern Pacific has become an enduring symbol of progress in our Western states. The first railroad to operate in the Far West, it started in 1855 with the laying of 23 miles of track between Sacramento and Folsom, California, and is now Southern Pacific's Placerville branch. From this historic moment on, the future of the West was assured – for within fifteen years, the great natural barriers to western expansion were breached, and the first transcontinental railroad service was inaugurated. Today, Southern Pacific's more than 12,000 miles of main line track link 8 Western and Southwestern states in a transportation web of paramount importance to continuing progress.

For the past 35 years of Southern Pacific's progress, Sinclair has played an important role as a supplier of vital railroad lubricants. Sinclair's GASCON® lubricating oils, for example, are used on many of SP's Diesels. Over 100 of America's top railroads now rely on Sinclair GASCON for Diesel lubrication. There's no better proof of dependability.

SINCLAIR RAILROAD LUBRICANTS

Railway Sales: New York • Chicago • St. Louis • Houston • Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

Move your freight cars with trouble-free

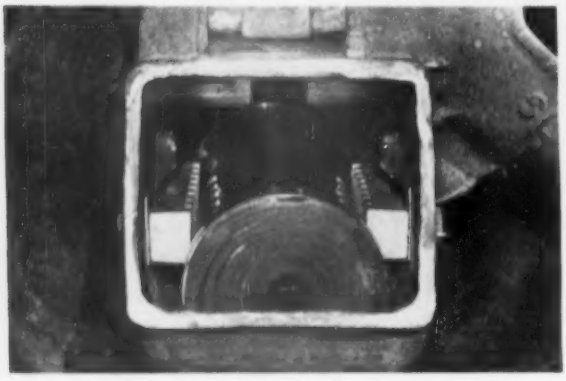
How R-S Journal Stops and Satco lining metal can reduce journal box servicing and maintenance requirements . . . can speed up train departures and eliminate need for servicing en route.

SATCO and R-S Journal Stops make the conventional waste pack an efficient lubricator. They give better bearing performance at the same time they reduce existing maintenance and servicing requirements. They eliminate old problems and *do not add any new ones.*

Equip all cars in a consist with Satco and Journal Stops and journal box inspection could be on a periodic basis—would not be required after each humping or switching operation.

The reasons: First, you seldom have to adjust packing and actual adjustment takes less time; second, you keep more oil in the packing, get constant lubrication; and third, bearings run cooler increasing vital oil film thickness.

R-S Journal Stops keep the packing right where it belongs—1" below the journal center line. Time and again road service tests with Journal Stops have proved that packing is undisturbed even after trips of 5000 miles or more. Without R-S Journal Stops, whenever there's a road or switching impact, or heavy brake application, you force the axle out from under the bearing. That crushes the dust guard, forces the box to rise, and squeezes the packing against the bottom of the journal—squeezes the



View of R-S Journal Stop installation with box jacked and bearing, wedge and packing removed. Note shims which permit maintaining nominal clearance on undersize journals.

Two of bearings removed after 38 months service in freight car equipped with R-S Journal Stops. All bearings were in such excellent condition they were reapplied. Crown has extended to point where it is wider than required for "fitted" bearings—but lining has not overrun.

MAGNUS METAL CORPORATION

TO DESTINATION

journal boxes!

oil out of the packing, too. This loose oil is free to splash out the back or front of the box—sometimes does before it can be reabsorbed.

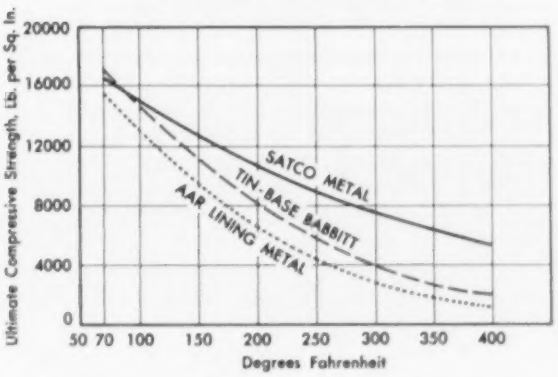
Journal Stops prevent all that. For more miles than necessary to cross the country, you can maintain oil-to-packing saturation ratios of better than 2.75 to one—more than adequate to lubricate efficiently. And because you don't compress the packing, you maintain constant journal-to-packing pressures—assure a constant feed of oil to the bearing.

WHAT SATCO CAN DO

Use Satco-lined bearings and R-S Journal Stops, and you lick the major problems that lead to bearing troubles. Bearings run about 20° cooler on Satco. You get lower operating temperature, higher operating oil viscosity, and a thicker film of oil. That all adds up to increased operating safety and better bearing performance.

Satco has a melting point 150° higher than standard AAR babbitt. It's harder and stronger at elevated temperatures. In the laboratory and on the road Satco has actually been run at temperatures of 400° F. with no effect on the bearing. That means high resistance to lint wipers and thread risers.

ULTIMATE COMPRESSIVE STRENGTH AT NORMAL AND ELEVATED TEMPERATURES



Ultimate compressive strength of Satco is higher at elevated temperatures but approximately same as other lining metals at starting temperatures. This assures high degree of conformability.

DYNAMIC LOAD FACTORS AND BEARING LIFE

R-S Journal Stops reduce dynamic load factors and Satco takes the toughest load you'll have. With Journal Stops the bearing always takes the load in the crown where it should, and Satco's extra strength at high temperatures assures added resistance to both wear and load. That means far longer bearing life—no spread linings, no cracked or shelled-out linings.

With Journal Stops you also get reduced and more uniform wheel flange wear, and the prospects are for reduced center pin wear and a lower mortality rate for coil springs. In fact, you cut truck maintenance costs all along the line—get big savings for a very small investment.

Of all the many developments designed to reduce hot boxes, R-S Journal Stops and Satco are the only ones which require no special maintenance or precautions and introduce no new problems to car servicing forces. They put the selection of any alternate type lubricator on a purely economic basis. Also you still have all the other advantages which low-cost solid bearings bring to railroad rolling stock. You can take the maximum load, and make the fastest schedule. Lading gets the smoothest ride. You save excess dead weight per car and get the lowest running resistance in pounds per ton. Best of all, you'll be sure of the kind of bearing performance you want at the lowest possible cost. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

Subsidiary of **NATIONAL LEAD COMPANY**

Quality is built into *genuine* Airco tips from bar stock to finished product. Here's how:

1. **SMOOTH TAPER**—Gases are thoroughly mixed with reduced turbulence, producing a smooth, stable, long flame.

2. **POSITIVE SEATING**—Exclusive Airco self-centering design gives ample seating area...a gas tight fit.

3. **TELLURIUM COPPER**—Heat-resistant. Orifice edges stay sharp, concentrate flame.

4. **SAFE CONSTRUCTION**—Heavy walls give adequate safeguard against accidental damage.

And there are many other reasons for using *genuine* Airco tips, *made by Airco* for use on Airco torches. One advantage is Airco's 100% inspection: *every* tip is inspected and approved before it is shipped. For instance, every tip is purposely backfired to test for flashback. Also, every *genuine* Airco tip must pass the flame stability test...the ability of the flame to relight itself after being interrupted. So look for the name *Airco* on every *genuine* Airco tip. It means that the tip you buy is made by the manufacturers of Airco torches...and it is backed by Airco's experience and integrity.

For more complete information on all Airco torches and tips, contact your nearest Airco office. Ask for catalog 818.

AIRCO®

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices in most principal cities

Air Reduction Sales Company
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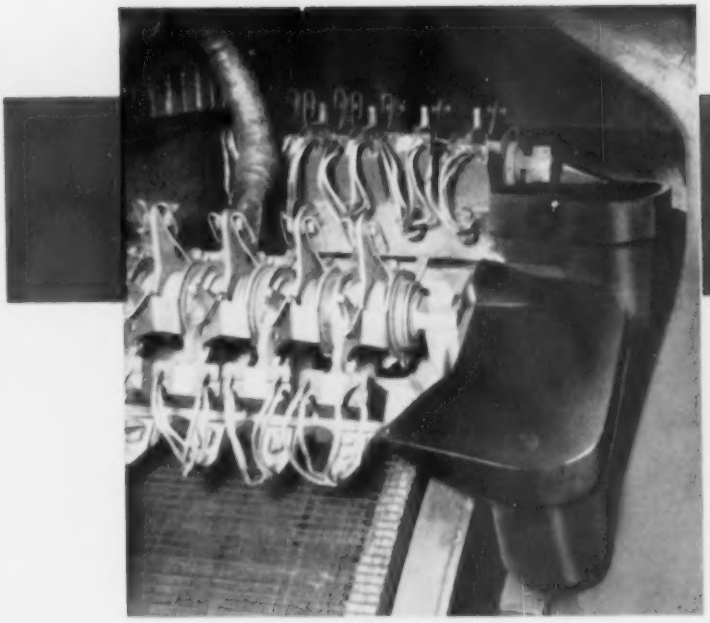
Products of the divisions of Air Reduction Company, Incorporated, include: AIRCO — industrial gases, welding and cutting equipment, and acetylenic chemicals • PURECO — carbon dioxide, liquid-solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • COLTON — polyvinyl acetates, alcohols and other synthetic resins.



NEW!

FLASHOVER ELIMINATOR

TYPICAL APPLICATION

For use with Polyester or Glastic pins — Cat. No. PB-198
For use with Ceramic pins — Cat. No. PB-134

CUT *COSTS* BY ELIMINATING FLASHOVERS ON DIESEL LOCOMOTIVES

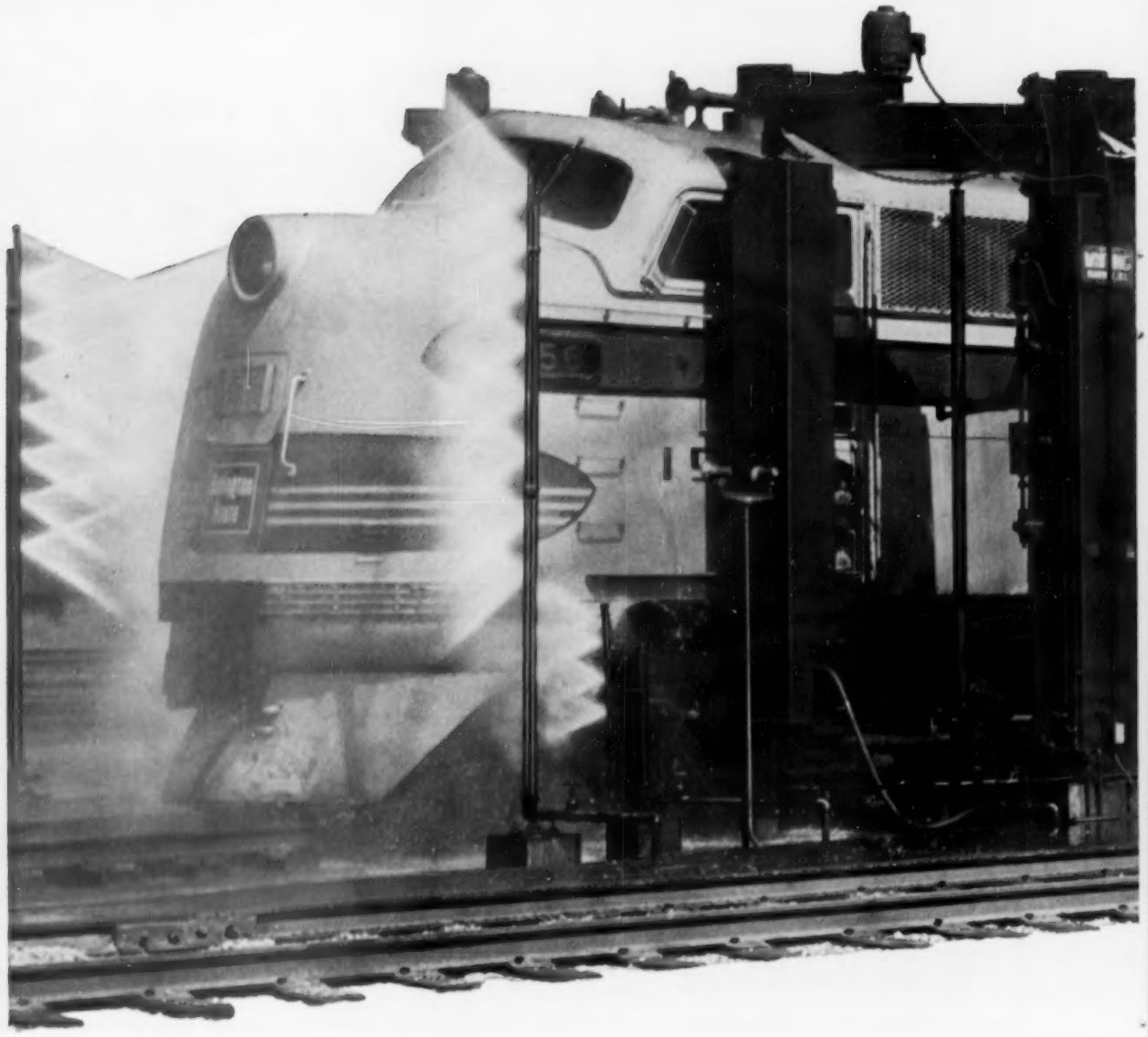
HERE'S THE EXPERIENCE OF ONE LARGE RAILROAD ON A TEST OF 100 LOCOMOTIVES FOR 360 DAYS . . . 11,250,000 MILES!

NO

- TRAIN DELAYS
- RUINED ARMATURES
- SHATTERED PORCELAINS
- DAMAGED BRUSHOLDERS

For Further Information Contact . . .

EQUIPMENT RESEARCH CORP.
64 East Jackson Blvd., Chicago, Ill.
REPRESENTATIVE IN PRINCIPAL CITIES



Wyandotte helps C B & Q give

Wyandotte cleaning products in this new Whiting washer *completely clean* a 4-unit Diesel in *6 minutes* – faster than most auto-wash assembly lines can wash your automobile!

The Chicago, Burlington & Quincy Railroad's new mechanical locomotive washer is another step in their "good housekeeping" policy . . . a policy which has won them many friends and customers.

Wyandotte products contribute to C B & Q's "good housekeeping" program. Wyandotte 75 is used, in the C B & Q washer pictured above, for exterior Diesel cleaning. Wyandotte 11 is used for vat cleaning; and other Wyandotte cleaning products are used in the plating department, dining-car department, and for building maintenance.

Other Wyandotte Products

You'll find Wyandotte has a full line of products to meet *every* railroad cleaning need. In addition to those mentioned are RILLOR, a mild alkaline cleaner; solvent emulsion cleaners; organic and inorganic paint strippers; and ZORBALL, the non-caking oil and grease absorbent for floors and other work areas.

Specialists in Railroad Cleaning Products

Three years of "good housekeeping" with Wyandotte products – This photo, taken when CB&Q installed its new Whiting washer in 1952, shows WYANDOTTE 75 being sprayed on a Diesel locomotive. We are happy to report that many railroads who believe that "good housekeeping" pays dividends, are purchasing more Wyandotte products than at any previous time in our history.

Diesels *6-minute wash!*

Call in your Wyandotte representative – let him show you the advantages of these and other cleaners from the complete line of Wyandotte products for railroad cleaning. *Wyandotte Chemicals Corporation, Wyandotte, Michigan; also Los Nietos, California.*

Wyandotte CHEMICALS

J. B. FORD DIVISION

Helpful service representatives in 128 cities in the U. S. and Canada

WYANDOTTE CHEMICALS CORPORATION
Department 2345, Wyandotte, Michigan

☐ Please send me free copy of Wyandotte book, "Railroad Cleaners and Cleaning Procedures."
☐ Please have a representative call.

Name_____

Railroad_____

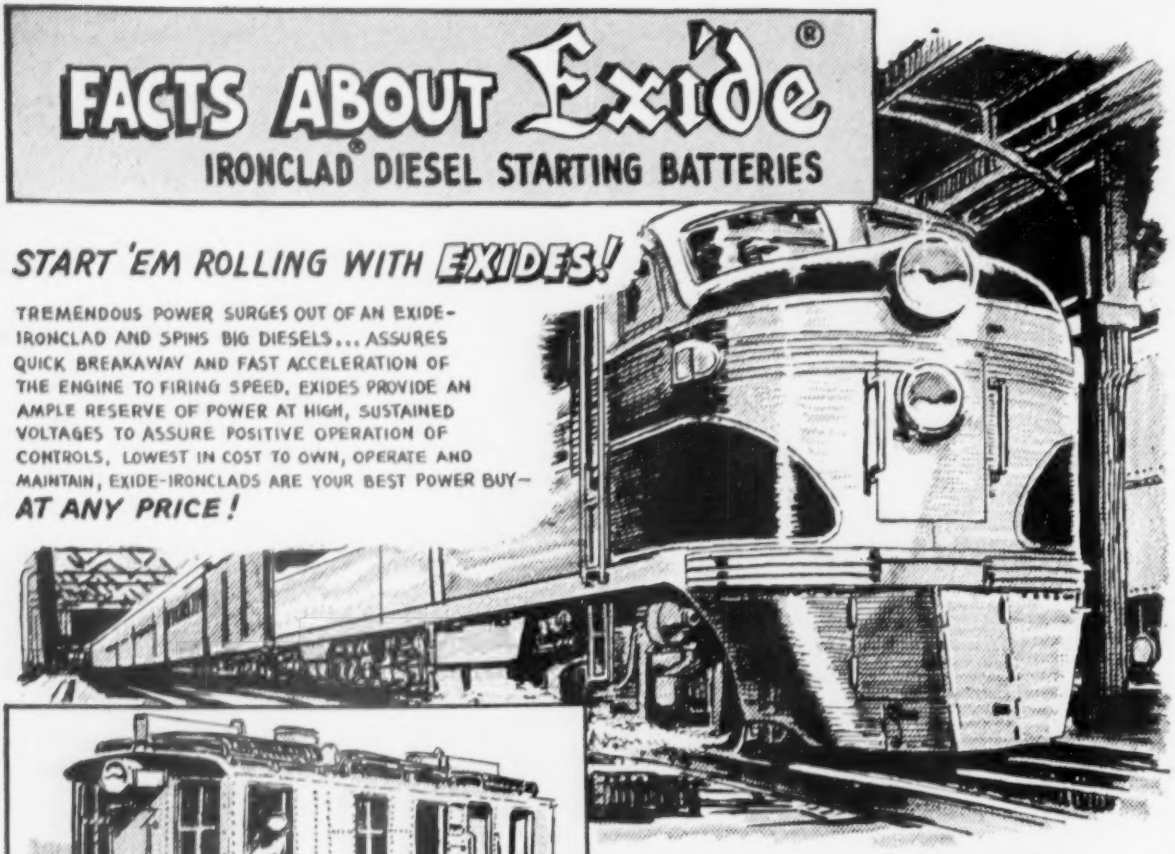
Department_____

Address_____

City_____ State_____

FACTS ABOUT Exide®

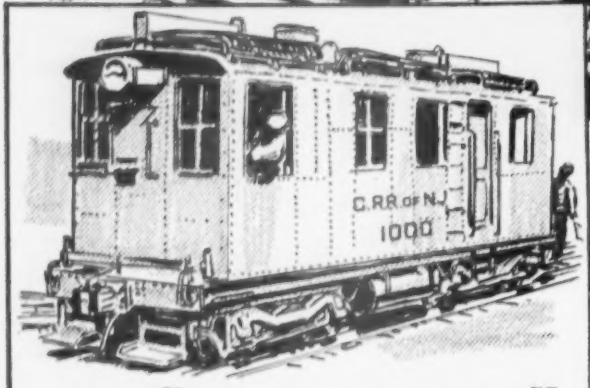
IRONCLAD® DIESEL STARTING BATTERIES



START 'EM ROLLING WITH EXIDES!

TREMENDOUS POWER SURGES OUT OF AN EXIDE-IRONCLAD AND SPINS BIG DIESELS... ASSURES QUICK BREAKAWAY AND FAST ACCELERATION OF THE ENGINE TO FIRING SPEED. EXIDES PROVIDE AN AMPLE RESERVE OF POWER AT HIGH, SUSTAINED VOLTAGES TO ASSURE POSITIVE OPERATION OF CONTROLS. LOWEST IN COST TO OWN, OPERATE AND MAINTAIN, EXIDE-IRONCLADS ARE YOUR BEST POWER BUY—

AT ANY PRICE!



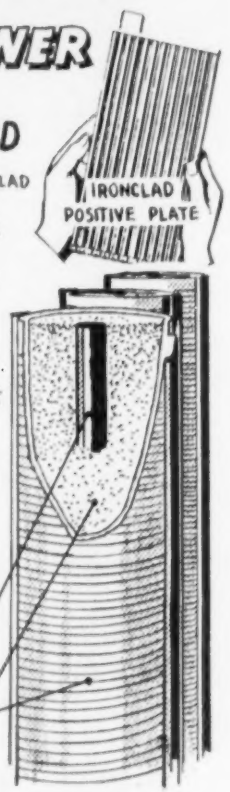
OLD "ONE THOUSAND"

AMERICA'S FIRST DIESEL LOCO HAS ALWAYS USED EXIDES!

A SMOKE ABATEMENT LAW AND SHARP SWITCHES CAUSED JERSEY CENTRAL TO USE THE FIRST COMMERCIALLY SUCCESSFUL DIESEL-ELECTRIC LOCOMOTIVE. THIS SWITCHER, OLD "1000," HAS BEEN OPERATING DAILY SINCE 1925 - AND HAS ALWAYS BEEN EQUIPPED WITH DEPENDABLE **EXIDE - IRONCLADS!**

TUBES OF POWER

WORK FOR YOU INSIDE AN IRONCLAD



SLOTTED TUBES INSIDE AN IRONCLAD KEEP ACTIVE MATERIAL IN FIRM CONTACT WITH CONDUCTING GRIDS OF THE POSITIVE PLATE... THIS GRID PROTECTION LENGHTENS THE LIFE OF THE BATTERY. SLOTTED TUBES EXPOSE MORE ACTIVE MATERIAL TO THE ELECTROLYTE... FOR GREATER POWER. FINE TUBE SLOTS HOLD MATERIAL IN CONTACT WITH GRID LONGER... RESULT, THE IRONCLAD'S ABILITY TO DO YOUR DIESEL STARTING JOB FOR A LONGER PERIOD OF TIME. THAT IS WHY EXIDE-IRONCLADS ARE YOUR BEST RAILWAY BATTERY BUY—

AT ANY PRICE!

LET EXIDE HELP SOLVE YOUR DIESEL STARTING BATTERY PROBLEM ❶ CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ❷ WRITE FOR FORM 4843 - ALL ABOUT MAINTAINING AND INSTALLING DIESEL STARTING BATTERIES.

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

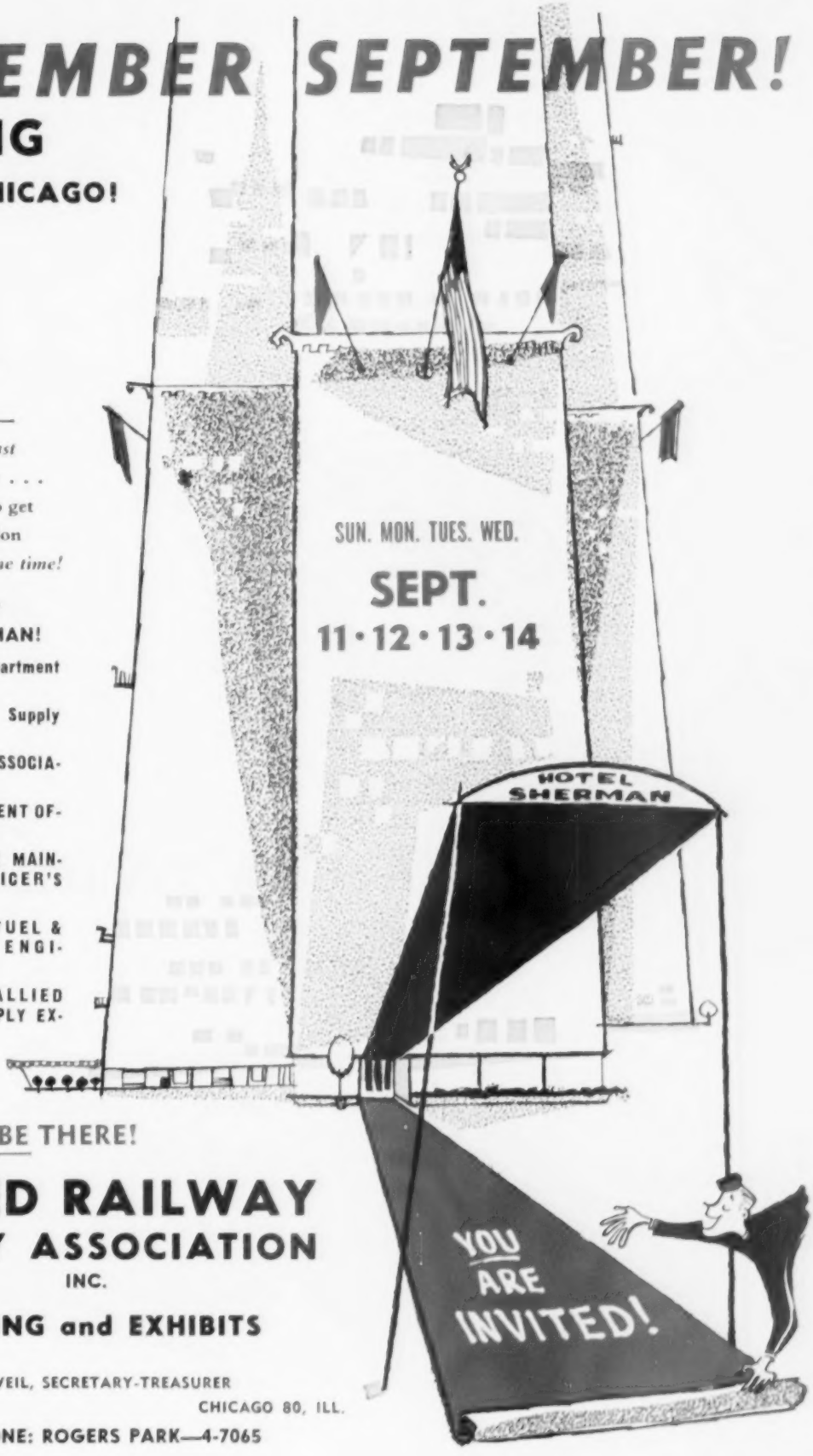
REMEMBER SEPTEMBER!

IT'S THE BIG WEEK IN CHICAGO!

SEE THE LATEST
developments in
railroad equipment —
things are moving *fast*
in railroading today . . .
here's your chance to get
up-to-date information
all in one place at one time!

ALL FIVE MEET AT THE SHERMAN!

- 4 Mechanical Department Conventions
- 1 Allied Railway Supply Exhibit
- AIR BRAKE ASSOCIATION
- CAR DEPARTMENT OFFICER'S ASS'N
- LOCOMOTIVE MAINTENANCE OFFICER'S ASS'N
- RAILWAY FUEL & TRAVELING ENGINEER'S ASS'N
- AND THE ALLIED RAILWAY SUPPLY EXHIBIT



BE SURE TO BE THERE!

ALLIED RAILWAY SUPPLY ASSOCIATION INC.

MEETING and EXHIBITS

C. F. WEIL, SECRETARY-TREASURER
P. O. BOX 5522 CHICAGO 80, ILL.
TELEPHONE: ROGERS PARK—4-7065

A Car Wheel Takes

A BEATING!

Operating at fifty, sixty, seventy miles an hour, having constantly to withstand high-velocity shock and impact—all this in temperatures from thirty below zero to one hundred above and sometimes more, *a car wheel takes a beating!*

Attached to its axle by friction alone and having to operate under these conditions *or else*, and that "or else" meaning nothing less than disaster, the wheel-to-axle fit has to be right. *There is no alternative!*

Wheel bores have to be straight, round and concentric! There is no alternative to that either.

Wheel boring is not a tool room job where you can fiddle and fuss to get accuracy. There are too many wheels and not enough time. Wheel boring is a high-production job where you have to get straight, round, concentric bores in one pass of the roughing and finishing tools.

Betts Car Wheel Borers are designed and built to give you accurate bores and fast! They are top-quality, high production machine tools.

CONSOLIDATED MACHINE TOOLS F/B

CONSOLIDATED MACHINE TOOL CO.
ROCHESTER 10, N. Y.
A Division of Farrel-Birmingham Company, Inc.

Photo courtesy of General Railway Signal Co.

What never stops "working on the railroad"?

Look at that signal. There's your answer.

Signals are always working to speed train movements and to increase railroading safety. Twenty-four hours a day, without interruption.

And — although storms or accidents may knock out the source of electrical power ordinarily supplied for its operation — there's little danger that a signal *won't* work.

If "line" power fails, a standby battery unit automatically takes over the load.

Many standby units are powered by nickel-iron-alkaline storage batteries developed by Thomas A. Edison. These batteries employ nickel active material and nickel flake in the positive element. No matter how often they get used they're always on the ready!

Nickel-iron-alkaline batteries don't deteriorate when idle. Don't freeze. And can't be damaged by the overcharging that usually occurs in this kind of service.

Their rugged steel cell containers as well as all structural parts of the cells are protected by an adequate deposit of nickel. To meet certain specialized requirements, the cell containers are sometimes made entirely of Monel®.

In general, nickel strengthens and toughens other metals, and imparts to them added corrosion resistance.

If you have a problem in which corrosion or ability to withstand stresses or fatigue at normal, high or low temperatures are troublesome factors, let's talk it over. Two minds are better than one, and we may be able to help you find how nickel or a nickel alloy can solve a troublesome problem for you.

Write for . . . List A of available publications. It includes a simple form that makes it easy for you to outline your problem.

Nickel Alloys Perform Better, Longer

INCO TRADE MARK **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N.Y.

Pressure washing plant layout.

High-pressure spray stand.

Cleans any contour.

Dearborn...the only system that cleans them all!

The Dearborn High-Pressure Cleaning System washes locomotives (road, switch, steam) and cars—regardless of contour. It automatically cleans tops, ends, sides and trucks; even wheels and bottoms, if desired. Dearborn Pressure Cleaning, when combined with mechanical brush washing, provides the ultimate in terminal passenger, locomotive and car cleaning.

ADVANTAGES: Saves time • Saves labor • Lowers cleaning cost per unit • Speeds up "terminal handling" operations.

Want proof? The coupon will bring complete details.

Washes road, switch and steam locomotives.

Cleans wheels and bottoms, also.

Pressure cleaning plus brush washing... an ideal combination.

Dearborn®

PRESSURE CLEANING SYSTEMS

Dearborn Chemical Company
Merchandise Mart Plaza, Dept. RL, Chicago 54, Ill.

Gentlemen: Please furnish complete details on the Dearborn Pressure Cleaning System.

Name.....Title.....

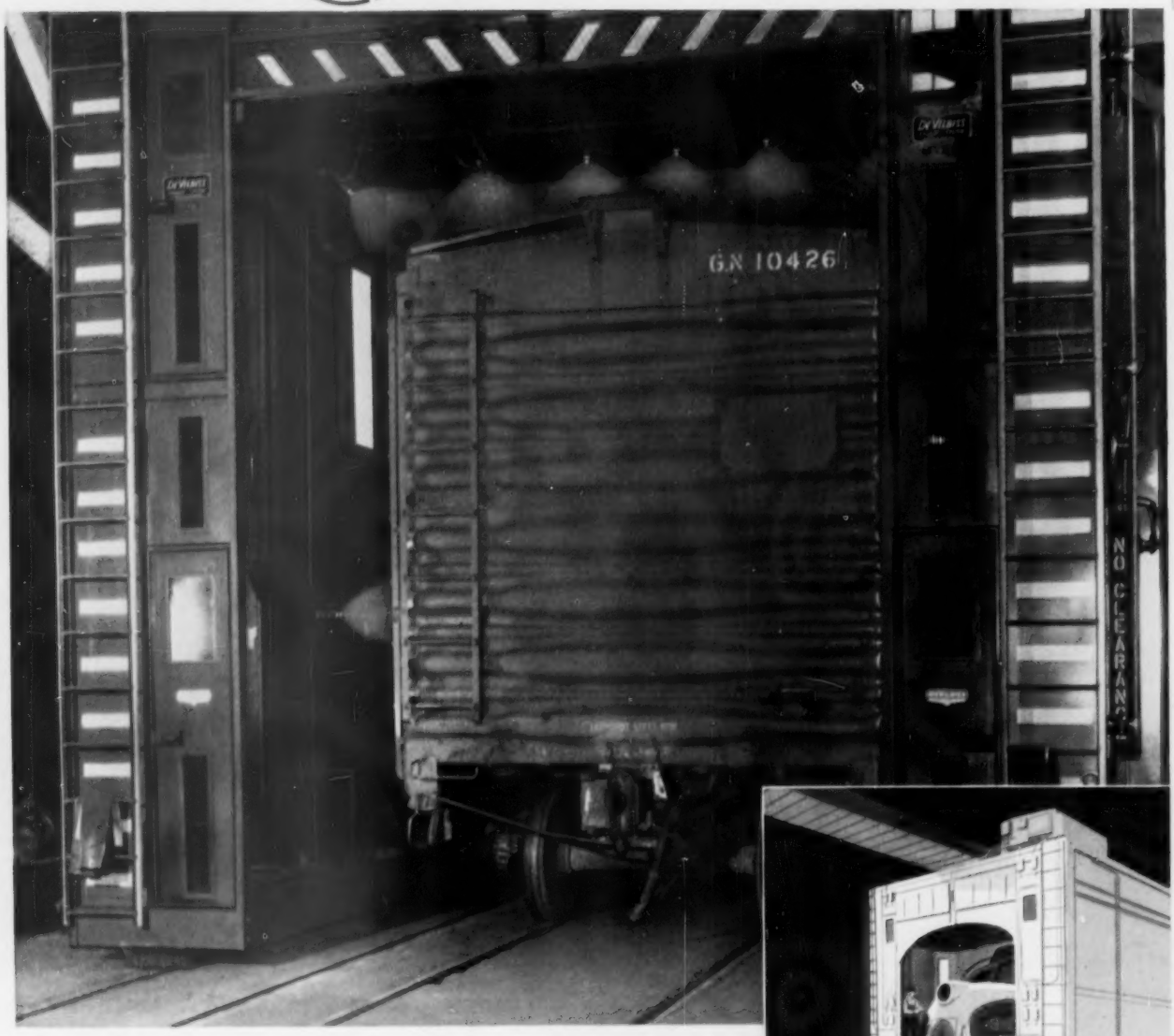
Railroad.....

Address.....

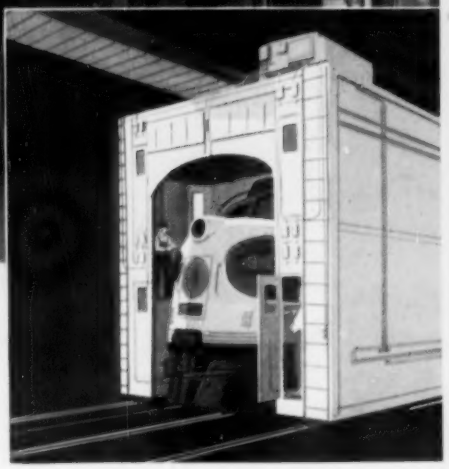
City.....Zone....State.....

DEVILBISS

TRAVELING
the completely
at costs far



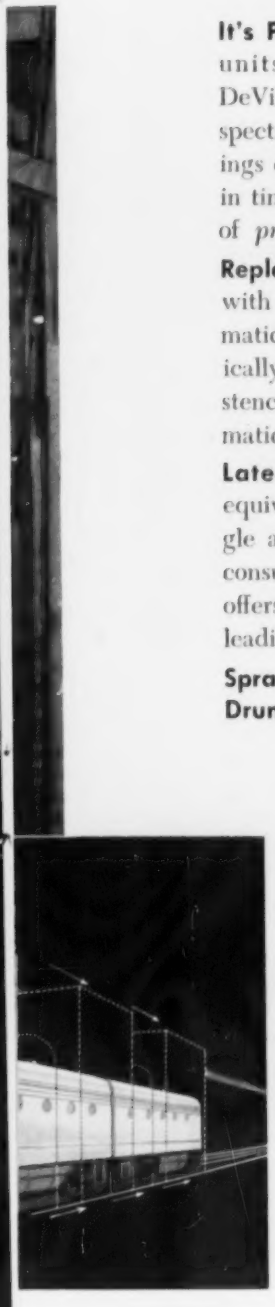
Painting boxcars automatically: sides are painted by spray guns automatically moving up and down. Tops are sprayed in either of two ways: (1) two guns moving back and forth on a curved track, or (2) a battery of fixed automatic spray guns (shown).



DeVilbiss Traveling Spray Booth is a completely self-contained paint shop; makes manual or automatic spraying of locomotives and cars a low-cost, controlled operation.

SPRAY BOOTH . . .

mechanized way to paint rolling stock less than any other method



It's Proved Equipment: Over twenty units in use by leading roads. The DeVilbiss Traveling Booth is producing spectacular results, with reports of savings of up to 85% in painting cost, 50% in time, and 80% in space . . . evidence of *proved* efficiency.

Replaces Manual Painting: When fitted with the high-output DeVilbiss Automatic Guns, the painting is done mechanically, swiftly and uniformly. All but stencil work and ends are done automatically.

Latest Type Hot Spray: Applies the equivalent of two-coat coverage with single application, uses less air, cuts paint consumption. New type hot-spray system offers exclusive features preferred by leading paint-material producers.

Sprays Directly From Original Paint Drums: Material handling is all but completely eliminated. Built-in pumps circulate paint through pipe lines to spray guns. Total material capacity: 220 gals.

Safety Confirmed by A.A.R.: See A.A.R. Report #8416 for the Fire Protection and Insurance Section's analysis of how the DeVilbiss Traveling Booth overcomes the dangers and fire hazards of other painting methods.

How Much Does It Cost? Based on installations actually made, with all equipment costs included, the investments have proved to be self-liquidating in from three to four years. Savings quickly exceed the purchase price of thirty- to fifty-thousand dollars. More than likely your present methods are costing you more than the price of a complete, modern DeVilbiss Traveling Spray Booth. Let us help you put an end to such waste.

YOU'RE INVITED TO BOOTHS 41, 42, 43

. . . at the A.R.S.A. Convention, Hotel Sherman, Chicago, to get the advance story on the newest of all railroad painting equipment being installed at the Norfolk & Western shop in Portsmouth, Ohio.

THE DEVILBISS COMPANY
Toledo 1, Ohio

Santa Clara, Calif. • Barrie, Ontario
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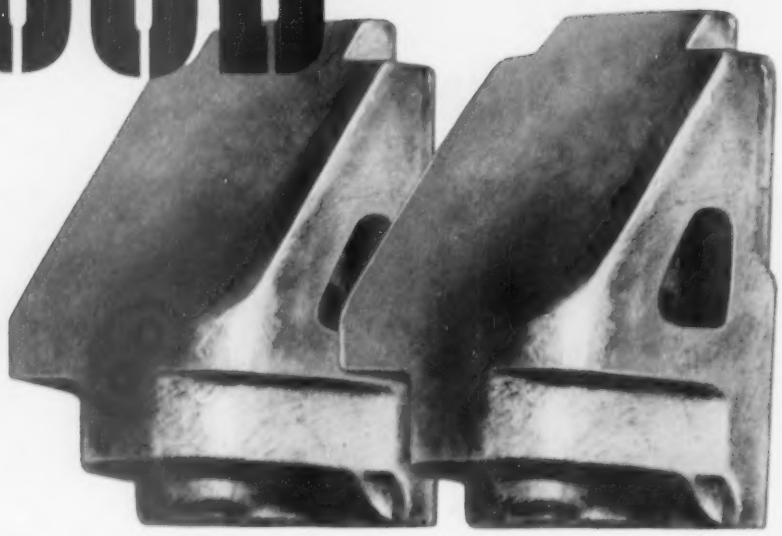
Branch Offices in Principal Cities Throughout the United States, Canada and the World

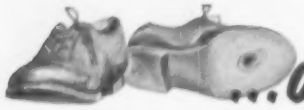
FOR BETTER SERVICE, BUY
DEVILBISS

GOOD



These are Barber special-alloy friction shoes.

FOR HALF A MILLION MILES . . .



. . . OR MORE!

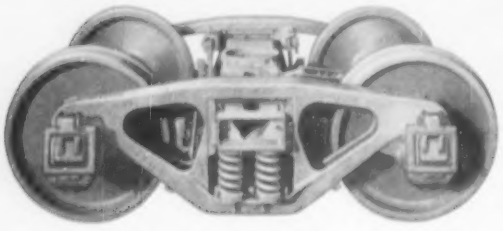
Then after 14 or 15 years of hard service, inspect the friction shoes of a Barber Stabilized Truck.

Any friction device should wear if it is operating properly. No *friction* means no *wear* . . . no shock-absorbing action. Knowing this, Barber has researched and tested the all-important friction-bearing surfaces of these shoes for many years. They are made to provide the longest possible service life consistent with the positive action that protects your ladings.

Occasionally a Barber Truck should have new shoes. Replacement is simple, quick and inexpensive in this, the easiest of all trucks to dismantle and service. Then at very small cost you will have completely restored the useful life and smooth-riding action of the Barber Truck for another half a million miles!

Specify Smoother-Riding

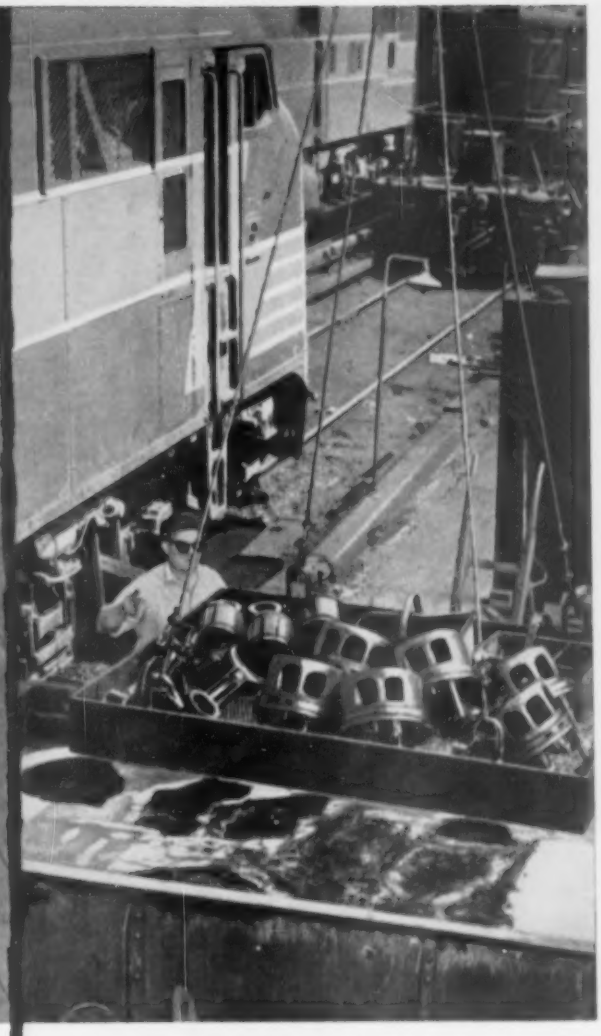
BARBER
STABILIZED TRUCKS



Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.

PENNSALT CLEANER 35—Soaks away soils—from road grime to baked-on carbon. Dissolves readily in alkali or mineral laden water without scum or sediment.

PENNSALT CLEANER 45-X—An ideal soak cleaner that also is an excellent spray for running gear.



The toughest parts come clean fast in this Pennsalt Cleaner soak tank, located in the shops of a major Eastern railroad.

One of these Pennsalt Cleaners will meet 95% of all your shop needs for maintenance cleaning of steel parts

Why stock a dozen types of cleaners when one of these two general purpose Pennsalt Cleaners will give excellent results at lower cost? They meet almost all your shop cleaning needs on steel parts—*and give you important extra advantages.*

Both are powerful, free rinsing, fused alkaline silicates. They have the sustained heavy duty action needed for thorough soak cleaning of diesel locomotive parts. They will do your pre-inspection cleaning, clean your air and oil filters, your cylinder heads and liners—even strip paint. They have low sludging qualities . . . need only occasional recharging.

Your Pennsalt Railroad Maintenance Man will be glad to recommend the right cleaners to meet your needs. You'll be surprised how few are needed for many jobs—how the *right few* increases shop efficiency.

Give your man a call today. Or write: Railroad Maintenance, Pennsylvania Salt Mfg. Co., EAST: Three Penn Center Plaza, Philadelphia 2, Pa., WEST: Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif.

Favorite of the men in the shops

Pennsalt Chemicals

The EP & SW No. 1, one of the first locomotives on the Rio Grande Division long since retired, now serves as a monument to the changes that create the past . . . assure the future.

Times have changed

SOUTHERN PACIFIC LINES

Today on the Rio Grande Division, you see these 2400 horsepower Train Masters hauling the tonnage . . . making top schedules. They mark the continuing progress on the Espee.

on the Southern Pacific

In a hundred years of railroading, the Espee has more than met the challenge of progress—with constant change.

Yet, one thing remains constant—top performance.

On the important Rio Grande Division, that performance is provided today by a pool of 16 Fairbanks-Morse Train Masters. As 2400, 4800 and 7200 horsepower locomotives, they handle east- and west-bound freight in manifest trains . . . symbol trains . . . and solid 100-car perishable trains.

This is typical of what sound management is doing to assure an even more progressive second century on the Southern Pacific.

Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

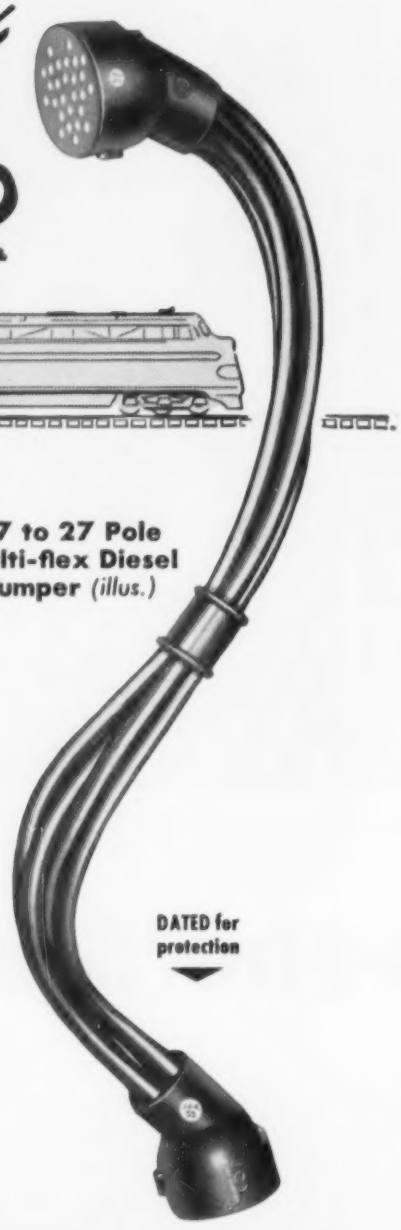
a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT
ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT

JOY *Multi-Flex*
DIESEL CONTROL JUMPERS
ARE GUARANTEED
for 2 Long Years

Need we say more . . .

Why be misled by reports of tests that fail to simulate actual road conditions . . . or be influenced by unsupported promises of low maintenance costs? *All* JOY *multi-flex jumpers are guaranteed to provide at least two years of satisfactory maintenance-free service* . . . many are still in use after 4 or 5 years of service. If a mechanical or electrical defect develops in a JOY multi-flex jumper under normal operating conditions within two years, we'll replace it, without charge . . . and to make certain that this guarantee is faithfully fulfilled, each jumper is clearly dated when manufactured *(see illus.)*. Supplied in standard lengths for 27 or 21 wire circuits with silver-plated contacts, JOY diesel jumpers are ready for use when received.



only JOY *molded Neoprene Diesel Jumpers have all these features*

1. Trim, factory wired one-piece Neoprene assembly. *Completely eliminates incorrect circuit hookups — a condition that has occurred with shop-wired attachable heads.*
2. Watertight, Shatterproof and Vibration-resistant.
3. Silver plating protects contacts from corrosion and increases conductivity.
4. Protective hanging sleeves . . . can't be misplaced.
5. Multiple cable for maximum flexibility between plugs.
6. Positively reduce diesel shop maintenance costs.

JOY MANUFACTURING COMPANY
HENRY W. OLIVER BUILDING, PITTSBURGH 22, PENNSYLVANIA
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LTD., GALT, ONTARIO

Consult a JOY *Engineer*

for information on these products

- Plugs and Receptacles for Air Conditioning and Battery Charging Requirements
- Dynamic Brake and Electric Airbrake Jumpers and Receptacles
- Inter-car Communication Jumpers and Receptacles
- Rotary Sand Dryer Screeners

JOY

SINCE 1851 - OVER A HUNDRED YEARS OF ENGINEERING LEADERSHIP

CD 155.3

SUPPLY TRADE NOTES

(Continued from page 20)

BULLARD COMPANY.—Bullard has released a motion picture called the "Yankee Toolmaker" commemorating its 75th Anniversary. The film shows the growth of industry from colonial times to the present and the part machine tools have played in that growth, with scenes taken at Sturbridge Village, Sturbridge, Mass.; Mystic Marine Museum, Mystic, Conn.; and the Long Island Auto Museum, Southampton, N. Y. It is in full color, 16 mm., sound. Arrangements can be made for showing the film by contacting the Advertising Department of the Bullard Company, Bridgeport 2, Conn. Free loan. Film runs 27 min.

■

HARRISON RAILROAD SUPPLY CO.—*F. B. Harrison, Jr.*, formerly manager of western railway sales for United States Rubber Company, has entered the railway supply field under the name of Harrison Railroad Supply Company, with headquarters at 215 N. Aberdeen st., Chicago.

William A. Baldwin

NATIONAL STEEL CORPORATION.—*William A. Baldwin* has been appointed sales manager for Nailable Steel Flooring and other transportation products of Stran-Steel at Detroit. Production and marketing of the steel flooring for railway freight cars, developed by *Great Lakes Steel Corporation*, have been assumed by Stran-Steel whose status as a division of Great Lakes Steel has been changed to that of a separate corporate unit of National Steel, of which Great Lakes also is a unit. Mr. Baldwin has been a Nailable Steel Flooring district sales representative, at Chicago.

■

TURCO PRODUCTS, INC.—A full color and sound, 23-min 16-mm motion picture, "Flaw Location with Dye Penetrants," has been completed by Turco and is available for free showing to industrial concerns, technical groups and other interested organizations. The film, which is intended primarily for training purposes, visually demonstrates every aspect of dye penetrant inspections from laboratory theory to authentic production-line techniques actually filmed on location during mass production dye penetrant inspections. On-the-spot inspections filmed include the production-line inspection of wing spars and small

WATSON-STILLMAN

Simplifies Piping Installation in Locomotive and Car Heating Steam Lines

Here's the ideal union for locomotive and car heating steam lines. It is readily installed in those hard-to-get-to locations beneath the frame. The clamp can be rotated so that the nuts are in the most convenient position for gripping and turning with a wrench. The union allows the pipe to be pre-fabricated and completely installed in the car frame. When used to join valves with matching ring faces, the W-S Clamp-Ring Union permits easy installation and removal of valves, and allows them to be rotated to any convenient position.

The W-S Clamp Ring Union is presently available in two sizes ... for 2" and 2½" IPS pipe. The 2" union has socket-welding ends, whereas the 2½" union is available with butt-welding or screwed ends. Other sizes are available on application.

Sold through Leading Distributors

For information on the Clamp-Ring Union and other Watson-Stillman Railroad Pipe Fittings send today for Bulletin RR-1.

WATSON-STILLMAN FITTINGS DIVISION

HKP H. K. PORTER COMPANY, INC.
Roselle, New Jersey

R3

FRAHM® and JAGABI®
Speed Measuring Instruments
. . . to meet every requirement
Write for Bulletin 35-X

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ALWAYS SPECIFY

MEGGER®
Electrical Resistance
Measuring Instruments
. . . for all electric, Diesel-electric locomotives and other electrical equipment testing requirements.
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parts at Northrop Aircraft, Inc.; the inspection of truck wheels and valves on the Union Pacific, the inspection of oil-tool components and aircraft gears at Sargent Engineering Corp.; the inspection of spindles at a bus lines company and the inspection of pressure vessel weld seams at Vulcan Pipe and Engineering Company. The laboratory sequence describes the theory behind dye penetrants in detail and outlines the proper methods of assuring complete inspection accuracy. A laboratory inspection is performed on glass microslides which have been fastened together to simulate a defect. In this sequence, the viewer is enabled to see exactly what action takes place when flaws are located in metal parts with dye penetrants. Arrangements for viewing the film or additional information may be secured by writing to Turco Products, Inc., 6135 South Central avenue, Los Angeles 1.

NEW DEVICES

(Continued from page 6)

filter-equipped units and checking the comparative results. A little over 100,000 miles of such comparative operation showed that there was no appreciable difference in the oil analysis between the two different types of cleaning equipment. *Electro-Motive Division, General Motors Corporation, La Grange, Ill.*

Drop-Shaft Hand Brake

This Peacock non-spin horizontal-wheel drop-shaft hand brake is designed for application to flat cars. To set the brake, the wheel is turned clockwise when looking down on it. Using only half this force and rotating the wheel counter-clockwise releases the brake. It can be released even though the brakes are held by an emergency air application. There is no pawl or trip.

The hand wheel and brake shaft can be raised or lowered when the brake is either set or released. All rotating parts are fitted with oilite or bronze bushings. Without the drop shaft, weight is approximately 70 lb. The brake has 20-in. of chain travel. It

for greater
RAILROAD
MAINTENANCE
SERVICE

FINE ORGANICS offers
2 EMULSION CLEANERS
that excel in

✓ SOLVENCY
✓ DETERGENCY
✓ DIRT PENETRATION
✓ EASE OF RINSING
✓ NON STREAKING
✓ NON STAINING

F.O.-106
Specifically designed for exterior car cleaning . . . the degreasing and cleaning of mechanical parts, motive equipment, engines, engine pits, shop floors.

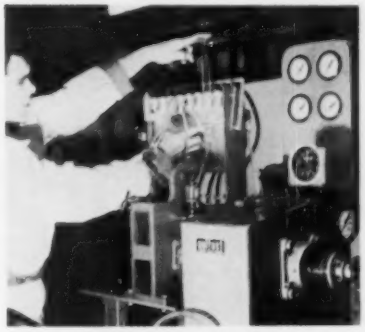
F.O.-116
Made to fulfill the need for a heavy duty cleaner and degreaser. Used for rugged jobs, under carriages and exteriors, running gear and surfaces — and areas subject to heavy oil, asphalt and other tenacious accumulations.

The superior solvency of these two emulsion cleaners . . . the effective dirt penetration and easy rinsability cuts cleaning costs and saves valuable personnel time

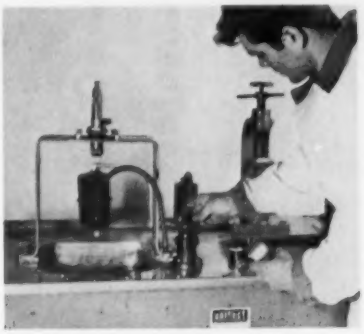
also available F.O.-162 and F.O.-102
Carbon Removers
F.O.-128 and F.O.-101
'Safe-tee' Solvents
Write to Dept. '3'. for complete information

FINE ORGANICS, Inc.
211 East 19th St. · New York 3, N. Y.

nas been tested and approved by the AAR. *National Brake Company, 30 Church street, New York 7.*



Fuel pump calibrating stand



Nozzle test and wash stand

Fuel Injection Equipment Testers

Testers which can be adapted to handle the fuel injection equipment of a number of builders are available for shops that must service various diesel engines. The Unitest fuel pump calibrating stand can be adapted for testing Bosch, Caterpillar, Cummins, Demco and International pumps, and General Motors Series 71 pump-injectors. This stand is equipped with two driving shafts and two groups of graduate tubes to permit the calibration of one pump while a second is being set up for testing, or to handle pumps with couplings on either left or right side. A Worthington all-speed drive simulates engine speeds from 150 to 3,000 rpm and a stroke counter registers either direction of rotation. A pre-set tripping mechanism automatically disengages the fuel discharge bar after the required number of strokes has been collected in the graduate tube.

A companion unit is the Unitest nozzle test and wash stand. This unit will hold fixtures for Bosch, Caterpillar, Cummins, Demco, and International injectors. Testing pressure is applied through a hand-operated pump which includes a Bosch final stage filter. Washing oil is electrically pumped at 30 psi pressure to a flexible hose near the holding arbor, and to a slide-valve operated nozzle tip wash unit. *Diesel Control Corporation, Wilmington, Cal.*

YOU can clean it FASTER with LIX!

All ferrous and non-ferrous parts are cleaned faster in a soak-tank with a minimum of labor. Lix Diesel Klean Heavy is a concentrate, and can be reduced effectively with mineral spirits. It will not corrode or damage any highly machined parts. It will not polute sewerage systems, streams, rivers, etc. *Lix can help you speed up your cleaning jobs.*

Many roads have changed to Lix cleaner, to do a better cleaning job faster and at less cost.

Use Lix Diesel Klean Heavy for cleaning cylinder heads, aluminum and cast iron pistons, fuel filters, airbrake assemblies, electrical contactors, brush holders, etc. Use spent Lix for trucks, floors, pits, etc.

Write today for your booklet telling how to use Lix cleaner . . . or better yet, ask for a Lix representative to demonstrate in YOUR shop. No obligation of course.

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

THE Lix CORPORATION

PRODUCTS OF RESEARCH

716 EAST 85TH STREET, DEPT. RL-8
KANSAS CITY, MISSOURI

Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number (s) on coupon below to receive desired information. Requests will be forwarded direct by the manufacturers.

1. HIGH STRENGTH STEEL. *U. S. Steel.* 174-page working handbook "Design Manual For High Strength Steels" for architects and engineers, to fill need from widening applications of high-strength low-alloy steels.

2. RINGS. *Precision Piston Rings.* 8-page 2-color brochure "Precision Un-Breakable Wrought Alloy Piston and Sealing Rings" gives technical data and complete descriptions of the physical properties of the eight alloys used.

3. AIR COMPRESSOR. *Ingersoll-Rand.* 4-page flier (3188) "A New Size Type 40 Motorcompressor 125 Horsepower Two-Stage Air-Cooled 80-125 psi" describes, illustrates and gives dimensions for the new electric-driven air compressor.

4. ROTARY BLOWERS. *Michle-Dexter Supercharger Div. Dexter Folder Co.* 6-page bulletin (255) illustrates and describes the versatility of application for M-D Rotary Blowers for all industrial products and processes, pressure or suction.

5. PIPE MARKERS. *North Shore Nameplate Inc.* 4-page catalog describes and shows uses of the Speedy-Marx Self-Adhesive Pipe Markers, an identification marker system using pressure-sensitive tape.

6. REFRIGERATION VALVES. *A-P Controls Corp.* 20-page 2-color catalog (W-S-3) "Dependable Refrigeration Valves, Filters, Driers" describes and illustrates the entire A-P line, includes charts, selection data, capacity tables on each.

7. WELDING PUBLICATIONS. *Air Reduction.* 16-page booklet "Airco Publication List—April 1955" lists over 100 welding and cutting technical reprints, text books, safety booklets, slidefilms and movies available; includes keyed order forms.

8. SELF-LOCKING NUTS. *National Machine Products.* 24-page brochure "Huglock, Self-Locking Nuts" contains engineering data, specifications and price list.

9. ARC-WELDING ELECTRODES. *American Welding Society.* 20-page specification pamphlet "Tentative Specifications for Low Alloy Steel Arc-Welding Electrodes" classifies electrodes by both chemical analysis and mechanical properties.

10. ADJUSTABLE-SPEED DRIVE. *General Electric.* 8-page 2-color brochure (GEA-6234) "New Thy-Mo-Trol Drive, General Purpose, Full Wave" describes, illustrates and gives specifications for the Thy-mo-trol adjustable-speed drive.

11. TAPES. *Bishop Mfg. Corp.* 8-page 2-color catalog (455) "Tapes For Sealing, Splicing, Jacketing, Insulating" describes, illustrates, gives properties and recommended uses, and illustrates typical applications of the company's major tape products.

12. HOSE FITTINGS. *Parker Appliance Co.* Four 3-hole punched catalog file sheets (4480A, 4484A) describe, illustrate and give specifications for rubber covered single fiber braid (non-metallic) hose for low pressure service and brass re-usable fittings for this hose.

13. ADHESIVES, COATINGS, SEALERS. *Minnesota Mining & Mfg. Co.* Illustrated folder describes the use of "3M Brand Adhesives, Coatings and Sealers" for joint-sealing, and bonding and protecting sheet metal; includes applications for nine of the company's materials.

14. WORK HOLDING EQUIPT. *Jergens Tool Specialty Co.* 64-page catalog (101) describes, illustrates and gives specifications on the complete line of Jergens Work Holding Equipment and Jig and Fixture Components.

15. STEEL PUBLICATIONS. *Allegheny Ludlum Steel.* 16-page pocket-sized folder "Publication List" describes literature available without charge on selection, fabrication and application of stainless and heat-resistant steels, tool and die steels, electrical steels and alloys, and carbide materials.

16. SANDBLAST EQUIPT. *Clementina Ltd.* 20-page catalog "Sandblast With Clemco" describes and illustrates 14 different models from 150-lb. to 1350-lb. sand capacity; includes latest accessory items.

17. MOBILE FLOOR CLEANER. *Handling Devices Co.* 2-color bulletin (551) "Which Will Clean Your Floors Faster, Better, More Economically . . . and Control Dust" details features of Floormobile for suction cleaning large floor areas; includes case history material.

18. HIGH STRENGTH STEEL. *Republic Steel.* Two 4-page folders (667, 668) give data, including chemical composition, mechanical properties, rolling limits and practices, on Republic "50" High Strength Steel and "65" and "70" High Strength Alloy Steels.

Reader Service Department **AUGUST, 1955**
Railway Locomotives and Cars
30 Church St., New York 7, N. Y.

Please send literature circled below:

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Also, please send me additional product information as follows: (company, product & page number) .....

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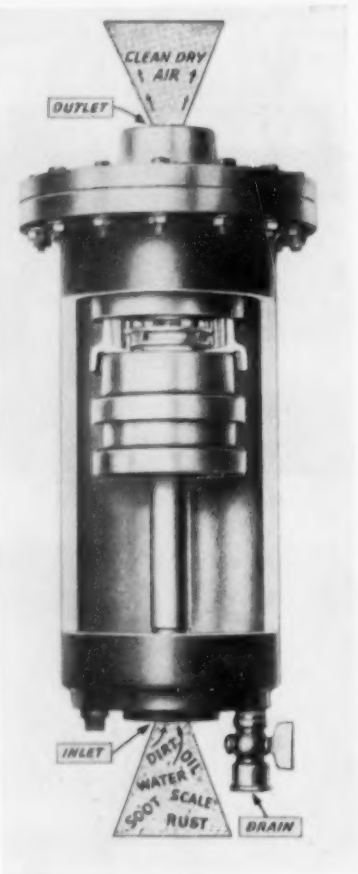


Maintenance-Free Air Separator

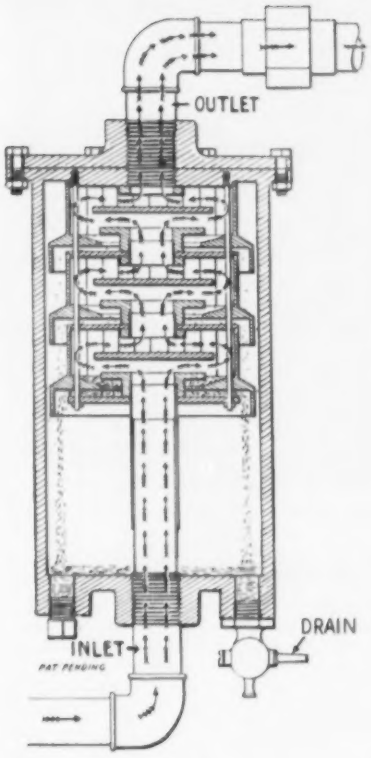
A new design of compressed air separator has been under test in yard air lines where it has effectively cleaned compressed air of water, oil, dirt, scale, cinders and other elements harmful to air-operated equipment.

A feature of this device, known as the Textite Air Separator, is an arrangement of cleaning elements which removes unwanted by-products of compressed air without the aid of moving parts to wear, or filter elements which must be cleaned or replaced. Only the air stream moves throughout the unit. A combination of centrifugal action, jetting, sudden expansion, capillary attraction and scrubbing removes the contaminants.

The air moves through a series of elements as shown on the drawing. It enters each element at the center and flows outward through spiral vanes. It then makes a sharp reversal and passes upward to the center of the next element.

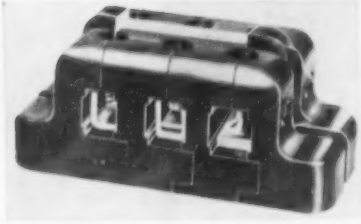
The water droplets removed from the air drop down along the inside of the casing for collection and removal. Thus no re-evaporation occurs because the air being cleaned does not come into contact with the water that has already been removed.

Because there are no filtering materials there should be no maintenance or servicing required other than draining the col-



lection chamber. The separator can be used with pressures up to 150 lb. It should be installed some distance away from the compressor to minimize the effect of pulsations.

The separator removes only water in liquid form—not the vapor that makes up the humidity content. Therefore, it must be installed beyond the after-cooler, so that the temperature of the air passing through the separator will not be appreciably higher than the temperature of the air will be where it is used. In this way, any water that is to condense out will have done so and can be removed by the separator. *Chicago Railway Equipment Company, 332 South Michigan avenue, Chicago.*



Sectional Terminal Block

Terminal blocks can be built up of any number of individual circuit sections. Adjacent sections are joined by three integrally-molded serrated pins mating with corresponding holes. This press-SURE-pin design is claimed to give one-piece ruggedness to the complete assembly that can be of any length. Every circuit section is com-

Cut Time in Cleaning Diesel Interiors

Cleaning the engine exterior, floors and walls need not be a time-consuming job. You can cut the time and manpower requirements of the job with Diesel Magnusol.

Safe and Sure

Diesel Magnusol is a fast-working cleaner, easily applied. You just mix the concentrated cleaner with water, and spray it on all surfaces to be cleaned. After it has soaked in for a short time, flush the cleaner and dirt away with water, leaving really clean surfaces. Diesel Magnusol is harmless to paints, to metals and to personnel. It is non-toxic and non-flammable.

For Very Dirty Jobs

. . . such as the interiors of switchers, mix Diesel Magnusol with safety solvent instead of water, but on road engines where a regular cleaning routine has been followed, Diesel Magnusol with water is all you need.

USE DIESEL MAGNUSOL FOR A MONTH

Order a trial drum. Use the Diesel Magnusol, as directed, for a month. If you are not completely satisfied at the end of the month, we will cancel the full invoice.

magnus CLEANERS

Railroad Division
MAGNUS CHEMICAL CO., INC.
77 South Ave., Garwood, N. J.

Please send us a copy of the Magnus Railroad Cleaning Manual.

NAME _____ TITLE _____
RAILROAD _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

FOR SUPERIOR RESISTANCE to ABRASION and CORROSION

Specify

STRATOFLEX

FLEXIBLE HOSE No 225

Built to give long service where conditions are especially rough on hose lines. Reinforced with high tensile strength wire braid with outer cover of tough synthetic rubber. In bulk Hose or Hose Assemblies with Stratoflex "over the cover" detachable, re-usable fittings. Write for your FREE catalog or order through your dealer.

★ Hose Assemblies

★ Re-usable Hose Fittings

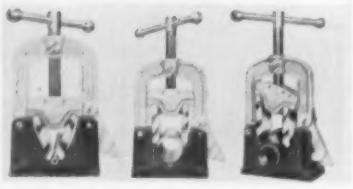
Dealership Available in Some Areas

STRATOFLEX

STRATOFLEX, Inc. FORT WORTH, TEXAS
P. O. Box 10398
General Offices—P. O. Box 10398
Fort Worth, Texas
Branch Plants—Los Angeles and Toronto
Sales Offices—Atlanta, Chicago, Dayton, Houston, Kansas City, Los Angeles, Portland, New York, Toronto, Tulsa

pletely surrounded by the molding material and has a factory installed contact that is plated with electrolytic copper and has a positive wire stop.

Three contact types are available for stripped or terminal-ended wires over the range from No. 18 to No. 4 wire. With the maximum wire size installed in any contact type, the contact screws never project above the upper surface of the block. Individual press-fit circuit sections can be factory assembled, or can be built up by the user with pneumatic or manual assembly fixtures. Slip-fit sections are available for hand assembly. This sectional terminal block has a rating of 70-amp and 750 volts. *Buchanan Electrical Products Corporation, Hillside, N. J.*



Pipe Vise

Rocking wedge jaws in this pipe vise are claimed to provide firm gripping action without crushing or marking pipe. Heat treated jaws and rugged construction are featured in this heavy-duty tool. It is stated that the jaws are versatile enough to securely grip pipe from ⅛ in. to 2½ in., and irregular shapes such as valves, tees, and other fittings. *Toledo Pipe Threading Machine Company, Toledo.*

Tool Grinders

Precision grinders with 6-in. wheels to heavy-duty machines with 14-in. wheels complete a line of four new Ex-Cell-O tool grinders. Each model is double-ended with a reversible motor for proper wheel rotation for both left- and right-hand tools. Grinding is done on the face of the plate-mounted wheels to give straight surfaces and accurate tool angles.

Tool rest tables are large enough to support tools firmly and are adjustable to the required tool angles. They also adjust toward the grinding wheels to compensate for wheel wear. Wheels are guarded, and the models equipped for coolant have splash guards. Silicon-carbide, aluminum-oxide or diamond wheels can be used to grind carbides, cast alloys, or high-speed steels. Wheels of two different types can be mounted on the two ends of a single machine.

The smallest model, the precision grinder Style 44-A, is especially suited for grinding carbide tools with diamond wheels. It is equipped with a coolant system. The largest model, Style 49-A, frequently is used for roughing operations, but is suitable for finishing large tools made from high-speed steels. *Ex-Cell-O Corporation, 1200 Oakman Boulevard, Detroit 32.*

Thread Inserts

Left-hand stainless-steel wire thread inserts are available in 20-thread, $\frac{7}{16}$-in. and ½-in. diameters, also a kit for the repair of automotive type spark plug threads. The range of kits now supplied will repair threads from No. 40 to 1½-in. diameter. The kits include the inserts, and the tap and inserting tool packed in a sturdy container. *Heli-Coil Corporation, Danbury, Conn.*

Try both—ON US!

Works in seconds!

Loosens Rusted Bolts
nuts . . . screws . . . parts
LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

Makes joints LEAKPROOF!
TiteSeal
GASKET & JOINT SEALING COMPOUND

7 BASIC BLENDS

Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.

- NON-SOLVENT—WILL NOT HARDEN
- WILL NOT SHRINK, CRACK OR CRUMBLE
- HEATPROOF AND VIBRATION-PROOF

Write for FREE sample

TWO of the many famous SOLDER SEAL products available from your Automotive, Plumbing or Hardware wholesaler.

RADIATOR SPECIALTY COMPANY
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How Metallizing saves money in railroad shops

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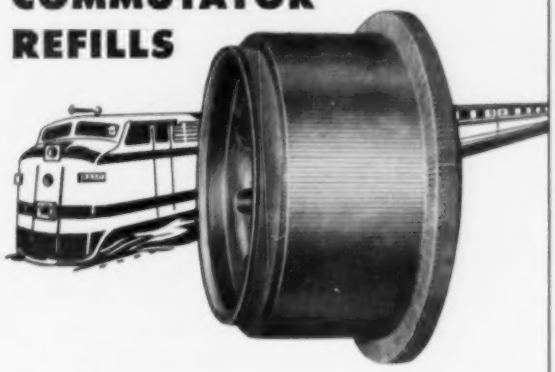

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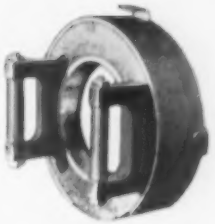

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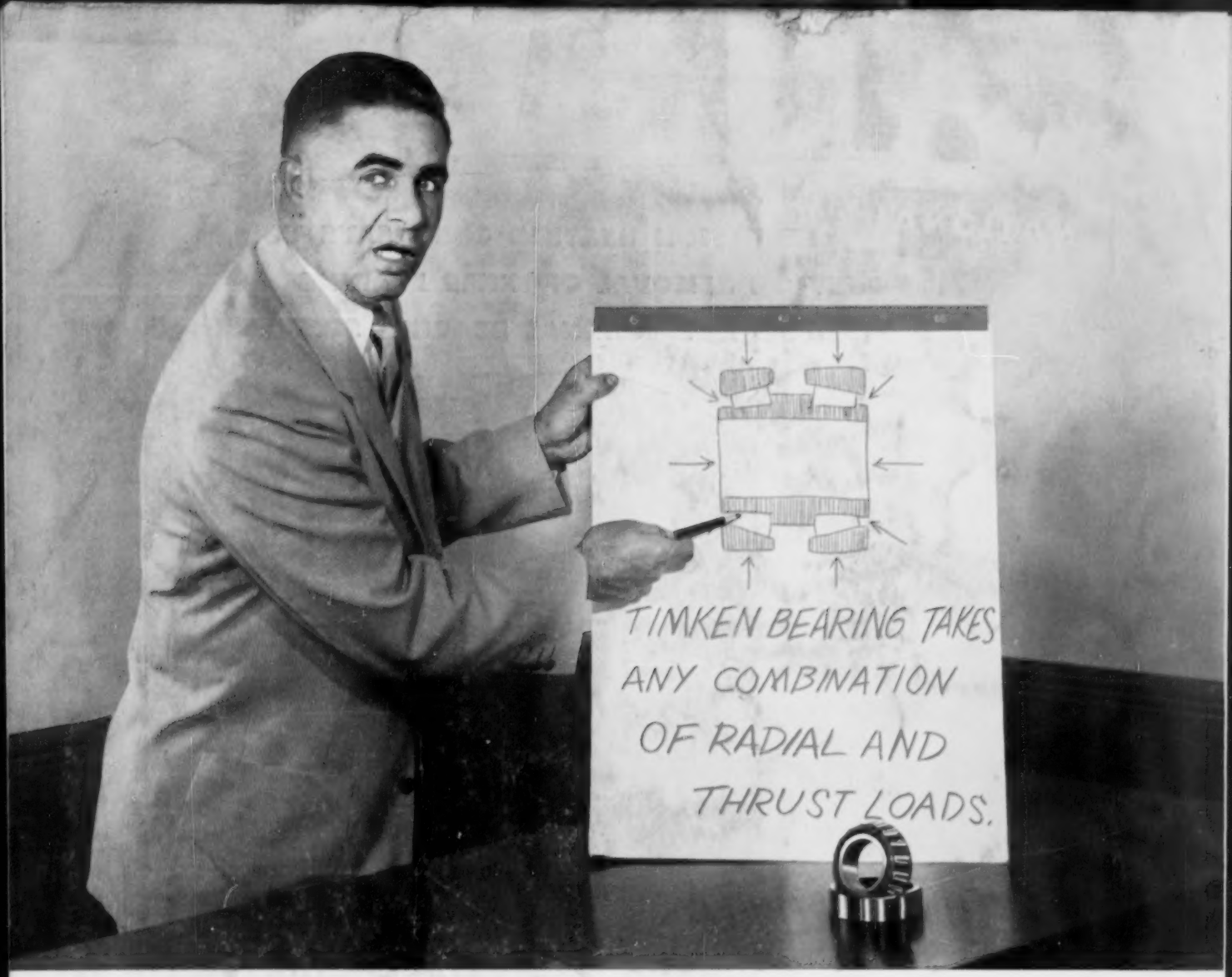

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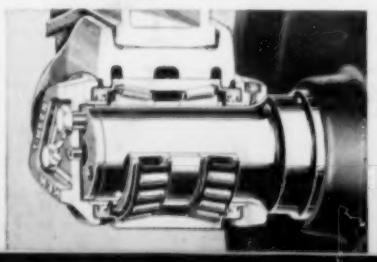

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